The Impact of Emotion on Mind-Matter Interactions.

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Abstract

The link between emotion and mind-matter interactions has been hinted at from a number of parapsychological sources, including the RSPK literature surrounding poltergeist outbreaks and a number of FieldREG studies. This thesis details a group of experiments that were carried out, looking into the impact of induced emotion, such as depression, elation and anger, upon the functioning of a Random Number Generator, within the laboratory. A variety of induction protocols were used, including autobiographical recall, self-referential statements and video stimuli, some of which were adapted from orthodox procedures into new and effective variants. Attention was paid towards the use of dynamically presented stimuli and it would seem, according to self-report measures, that they effectively facilitated emotional change.

Positive results from these experiments suggest that emotion is indeed an important factor in PK functioning. The RNG was predominantly used as a passive measuring device, and participants were not asked to attend to it, yet results seemed to indicate that RNG anomaly could be facilitated by the dissipation of negative mental states such as anger and depression. Speculation is provided as to why such mental states might underpin PK, and ideas advanced for future research in this area. Alongside the laboratory based investigations, a sizeable body of data was accumulated under more naturalistic conditions, which also showed some evidence for emotion facilitating PK. Reasoning is subsequently provided as to how psi effects may manifest themselves in the real world, and how psi may interact with emotional and cognitive processes.

With PK experiments, concern has been voiced as to the root cause of the effects. There are many potentially confounding sources including the subject's unconscious, and interactions from individuals not intimately connected with the study. Consideration is given to these sources with particular emphasis on the role that the experimenter plays in influencing the RNG. Furthermore discussion is also made as to whether the experimenter, aside from generating anomaly, is in some way responsible for mediating the interactions of his subjects.

Empirical studies have tended to measure PK through deviations above or below chance expectancy on the binary output of a random source. Unfortunately these deviations in themselves lack any real meaning and the effects can prove somewhat arbitrary. As such exploratory work is included that investigated an alternative way of measuring PK that was considered meaningful to both subject and experimenter. Later chapters are given over to considerations of possible directions for emotion based research in parapsychology, and specific procedures that could be employed to accomplish emotional change.

Declaration

I declare that this thesis and the research contained herein, is my own work.

James Lumsden-Cook. 8th September 2003

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Chapter 1 – Introduction

Terms

Psychokinesis (PK) can be thought of as a mechanism whereby the mind can independently affect a separated system. Although anecdotal evidence is available from a variety of sources across cultures and history, the empirical method beloved by modern science has rightly required a greater burden of proof into PK's validity. This requirement has seen research shifted to the laboratory where studies into large scale effects have been sidelined in favour of tightly controlled and replicable methodologies revolving around probabilistic systems and statistical inference. As such, one refers to these studies as micro-PK, with the implicit notion that an effect is not visible until statistical analysis is employed. Larger scale PK episodes, which can be witnessed without statistical assistance (e.g. levitation, or the movement of physical objects) are generically termed macro-PK.

The evolution of Micro-PK research

Micro-PK research gained scientific prominence during the 1940s under the guidance of J.B. Rhine, founder of the eponymous Research Laboratory in Durham, North Carolina, USA. Rhine carried out and oversaw a catalogue of experiments that examined whether volition could effect the falling of rolled dice (e.g. Rhine 1943, Gibson & Rhine 1943, Rhine & Humphrey 1944). Decades of research ensued, both by Rhine and others such as Mangan (1954), Ratte (1960), Steilberg (1975) and Nash (1981). In 1991 a meta-analysis by Radin and Ferrari offered some insight into this research, drawing data from nearly 3 million trials between 1935 through 1987. Mean chance expectancy predicted a 50% hit rate, yet results showed a 50.02% hit rate for control studies, and 51.2% under active influence conditions - a small intergroup difference certainly, but one that represented a chance likelihood of $p<10^{-70}$.

Dice research does hold some inherent issues. Firstly, the physical process of rolling is time intensive and requires minimum standards (such as throwing the dice a sizeable distance, bouncing the dice off walls etc) to counteract any throwing biases and promote randomness. Secondly, the data recording associated with dice studies was manual and therefore more open to recording errors (although some researchers overcame the problem by photographing each trial outcome). Thirdly, some dice hold very

small weight biases, such that the six faces are not equally balanced, a '1' for example is of greater weight than a '6' because it has six times fewer spots carved out, making it slightly less likely to be rolled. Indeed Radin and Ferrari found such systematic bias in their data set,: *"we examined all reports where published data allowed the separate calculation of effect size for each die face tossed under experimental and control conditions. The biases...found in these studies* [are] *indicated by a high correlation between the experimental and control curves (r=0.826)"* p74. They then concluded that the bias was not large enough to account for the overall results and suggested further anomaly (psi) was present. In addition, analysis was undertaken that looked solely into studies that used all six faces as targets in equal measure (balanced protocol) – and found anomaly to $p<10^{-14}$. Fortunately fast, unbiased, automated measuring systems have been developed, which have reduced many of the experimental concerns and instilled a higher degree of confidence in micro-PK study.

In 1961, Beloff & Evans examined without success whether the mental intent of 30 subjects could influence the radioactive alpha decay of uranyl nitrate. They instructed their subjects to increase and decrease the number of counts picked up by a geiger counter from their radioactive source over one minute, although a potentially confounding reward of 'half a crown' was offered to those who produced a sizeable difference between the low aim and high aim trials. Each subject completed 20 trials, lasting sixty seconds, with feedback at the culmination of each trial. The overall results showed that the high aim condition produced 17,393 counts whilst the low aim condition produced 17,458, and that no effect was at play. Radioactive decay is a process governed by entropy, and is thus considered unpredictable and closed to influence. There are no known means of modifying the rate of decay, nor calculating when a particle will decay. All that can be established, is that over a defined period of time, a statistical effect will occur, and should a PK effect exist, it seems suggestive of a causal interaction between mind and the nuclear forces holding the source together, or an ability to predict the 'right' times to measure the output.

However, in 1965 Chauvin and Genthon (cited by Schmidt 1987) succeeded where Beloff and Evans had not. They reported significant anomalies in the number of geiger counts from a uranium source, during one minute trials, under a system biasing protocol (i.e. subjects asked to speed up or slow down decay). Such results, if replicable might then provide evidence for the conclusion that consciousness

can interact with supposedly inviolable systems, and that conscious organisms may be more than passive observers across multiple realms including physics, biology, philosophy and psychology.

The use of radioactive sources and quantum decay went on to become a popular means of measurement in PK research for many years, due in no small measure to the leading efforts of Helmut Schmidt (e.g. Schmidt, 1969; Schmidt, 1970 etc.). However, as time progressed, technologies grew and the measuring devices became more sophisticated. Quantum processes were combined with logic circuits and timing mechanisms to produce a new generation of tools, commonly known as Random Event Generators (REGs), or Random Number Generators (RNGs). Commonly allied to these REGs may be a form of trial feedback. For example, in 1970 Schmidt used the visual feedback of a circular array of nine lamps, (the illumination of which was governed by quantum decay), and instructed subjects to light the lamps in either clockwise or anti-clockwise directions. Alternatively in a 1976 journal article, Schmidt discussed a study he had carried out in 1973 that used radioactive decay and audio feedback to produce start and stop signals on a timer. *"It was hypothesized that the subjects' eager and expectant concentration on the next click would activate a PK mechanism such as to make this click come in earlier than expected by pure chance"* p276. Under control conditions, a signal was generated (on average) every 6.4 seconds, but under experimental conditions (400 trials and 20 subjects), this period was reduced to 5.4 seconds. Whether it was the *'eager and expectant concentration'* that facilitated an effect is open to debate, and discussion will be given over later in this thesis to alternative sources of psi.

Pseudo versus True

One needs to clarify here the dichotomy between 'true' and 'pseudo' RNGs. Pseudo RNGs use a mathematical algorithm to generate data, and the pattern of randomness is a function of the algorithm and an initial starting value (known as the seed number). Although the output might look random, a foreknowledge of the algorithm and seed number renders the output entirely predictable. True RNGs, on the other hand, use entropy as their sources of randomness, such as the aforementioned radioactive decay or as is commonly used now – electronic noise - which is generated as an electron bounces along its conductor. By setting threshold parameters for this noise, a binary signal can be established. Modern RNGs use a variety of sophisticated electronics to prevent potential confounds, for example The PEAR

(Princeton Engineering Anomalies Research) Group have used XOR logic gates such that: *"every second bit is inverted to preclude first-order bias of the distribution mean due to short- or long-term drift in any analog component"* (PEAR technical note, 1998). Importantly, it seems that no matter how complicated the measuring system, its lability does not appear to be compromised. This characteristic led Schmidt (1975) to propose a teleological model of psi, where the end result or goal state, is all the subject need concentrate upon - psi fills in the blanks. Such a proposal gains credence from studies such as that of Stanford, Zenhausern, Taylor & Dwyer (1975). In their study, subjects were engaged in an 'extremely boring' motor task. Unbeknownst to them, their release from this task was governed by the output of an RNG, which qualified participants to take part in a second 'pleasant' task – rating sexually arousing photos. Eight subjects (from a pool of 40) managed to extricate themselves from the boring task early whereas theoretically only 2.9 should have ($p=0.007$). Stanford et al suggested that the successful participants sought to relieve themselves from the dull task and thus unconsciously interacted with the psi mechanism that facilitated task completion. However, the problem with teleological models of psi, is that any event can be influenced by anyone who had an 'interest' in the outcome (the divergence problem) irrespective of when that interest was established. As Schmidt (1975) wrote: *"the outcome of a PK test depends not only on the overt PK subject, but also on all the observers who look, no matter how much later, at the results, provided these observers can exert some PK effect."* p316. Real difficulty arises therefore in calculating where any anomalous interaction has originated, and since the experimenter is most closely integrated into the study, there are multiple opportunities for him to exert an influence.

RNG meta-analyses

In 1989 Dean Radin teamed up with Roger Nelson to meta-analyse the RNG database. They incorporated 152 articles relating to over 800 formal and control studies, and found a small but robust effect size of (0.0003), corresponding to a p value of 1.8×10^{-35}. In 2002, Radin & Nelson updated their 1989 research to incorporate studies between 1987 and 2000. The 92 new publications from after 1987 produced a combined z of 5.86, which taken in conjunction with some newly uncovered pre 1987 studies and the data from the 1989 analysis boosted the p value greatly ($p<10^{-50}$). The effect size across this dataset remained small, equivalent to a 0.7% shift away from the expected 50/50 split.

Steinkamp, Boller & Bösch (2002) conducted their own meta analysis of the RNG database, specifically looking at whether 'moderator variables' affected study outcome. The moderator variables included: the selection of participants (gifted against non-gifted), the type of RNG (as per source of randomness) and the type of feedback provided (e.g. visual versus auditory etc) Before proceeding further, it is important to point out that certain studies were not included, such as: *"Those that looked for a non-intentional, or only ambiguously intentional, effect. For example, studies using hidden RNGs, or with babies as participants, were excluded."* p262. The authors incorporated 357 experimental studies and 142 control studies that had been carried out prior to August 2000, and discovered that studies with gifted participants outperformed those that used unselected ones, and that studies utilising radioactive decay RNGs produced greater anomaly than electronic noise based ones. One other primary finding was that when the analysis was weighted according to study size the combined stouffer z dropped from 13.09 to the far less significant value of 2.70 ($p=0.004$). The effect size, represented as per Rosenthal & Rubin's 1989 proportion index, was $\pi = 0.50003$ (0.0003% away from the 50/50 split), and this remained the same across weighted and unweighted analyses. Put simply, Steinkamp et al. found that most of the overall anomaly seemed to stem in general, from the smaller studies, although this effect was non-linear. No speculation was put forward by the authors as to why this effect might appear and they concluded that: *"... the experimental database was extremely heterogenous in character, indicating that there were factors at play that may not be due to chance alone."* p269

Although the meta-analysis work can be seen to provide compelling evidence in favour of PK's validity, some argument exists that with very small effects, some undetected artefact may be more likely (although no-one knows what it might be) or that results *must* be invalid because PK violates the 'accepted' laws of physics and is therefore, a priori, impossible. Thus, in addressing this second point and for the benefit of the reader, it would prove fruitful to look at PK theory and relevant current physics research.

Is not PK impossible?

Since micro-PK measuring systems typically operate at the quantum level some theories have attempted to integrate quantum mechanics and psi. Schroedinger explained how an object prior to observation was a wave function of all its possible states (Ψ) and observation caused a reduction of the

wave function into one fixed state (Ψi). By interacting with an object in an attempt to observe it, the wave function must now accommodate the observer in its potentialities, creating more potentialities. This is known as the measurement problem – the idea that observing a system changes it. All systems made up of matter are subject to this view, and one might argue that observation provides a mechanism whereby consciousness (our observing system) could interact at a quantum level. If we could look at a system at a suitable moment, we could (theoretically) collapse the wave function and force the system into a pre-chosen outcome (Ψdesired).

Another benefit of quantum mechanics is that systems do not have to be in physical contact to exert an influence. In 1935 Einstein, Podolsky and Rosen predicted how particles that have been, at some stage, in contact with one another (entangled) will continue to influence each other synchronously, no matter how great the distance. Although the EPR paradox was put forward to illustrate that quantum mechanics was in some way incomplete, the phenomenon has gone on to become experimentally proven (by Friedman & Clauser in 1972) and now exists under the moniker of non-localised causality. To draw an example, consider two paired photons. One characteristic they share is that they hold opposite spin (angular momentum) to one another. Under non-localised causality, should the spin of one be affected, the spin on the other photon will simultaneously change to the exact same degree. Some theorists (e.g. John Bell) suggested that there must be some form of local contingency (hidden variables) built into the system, whereby rules govern what the photon should do when it 'learns' of its partner's behaviour; however any information transfer between photons would have to operate faster than the speed of light, which special relativity forbids, thus negating this alternative. In a nutshell, the two photons remain perfectly synchronised across space and time without any form of known communication between them. Walker (1975) and Schmidt (1984) have both postulated how it is possible for psi to utilise this quantum effect. Simply put, the observer (PK agent) chooses a desired outcome and collapses the state vector at the 'right time' - non-localised causality provides the mechanism. Some might argue that the divergence problem would see particles being wrestled between outcomes as multiple observers attend to the effect. However, it may or may not be that once an event has been physically observed for the first time, the outcome is fixed, and no further psi interaction can change that.

In order to manipulate a system, any PK agent would have to transfer coveted properties onto removed particles, a process known as 'quantum teleportation'. Although teleportation is popularly thought of as the transmission of a group of particular particles (Λ) between two points (A and B), in physics in can also mean the transference of quantum states between systems. Thus the transmission of Λ at (A) produces an identical copy at (B). It was thought for a long while that this 'quantum teleportation' would be impossible, because to transfer information about the particle's state would involve measuring position and momentum; under Heisenberg's uncertainty principle - by measuring one to a greater and greater degree of accuracy, the less you know about the other.

The problem however goes away, if no effort is made to learn of the system state during transmission. Bouwmeester et al. (1997) reported that they had successfully carried out quantum teleportation between two paired photons by entangling a third photon. By placing this third photon in contact with one of the paired photons, its properties were transferred – and instantaneously the second photon in the pair changed its properties in line with the first. The following year, Nielsen, Knill & Laflamme (1998) also confirmed that they had achieved quantum teleportation, providing further evidence that systems could be effected without any form of direct contact. Whether or not PK turns out to be facilitated through quantum effects, one cannot reject the idea of removed interactions, a priori.

On the other hand, one can elaborate an entangled model further. Since the human body and mind are made up of fundamental particles, there exists no reason to believe that they are not subject to quantum entanglement. Under a cascade hypothesis, a few selectively chosen neurons triggered by a remote source and firing in unison can generate a rich perceptual experience. Likewise a reversal in direction whereby neuronal activity could entangle and effect a removed system is equally viable. Josephson & Pallikari (1991) have argued that organisms could indeed utilise quantum entanglement and EPR effects in producing psi phenomena. Furthermore they discuss remarks from David Bohm suggesting that superconductive biological states may be most susceptible to non-local interactions, and Josephson (as well as Hammeroff 1994) has considered that microtubules found in the brain are plausible sites of interaction as they hold properties similar to those that have been shown to display quantum tunnelling effects.

Thermodynamics

The 2nd law of thermodynamics, considered by many physicists to be an absolutely inviolable law, has also been held up as a reason to reject psi. Basically, the 2nd law states that entropy (disorder), increases as systems lose energy, consciousness would have to oppose entropy, adding energy and imposing order, which it is argued is impossible. Worldly observations suggest that such a view is correct, objects do not mysteriously heat themselves, they only get cooler. Entropy thus hands psi researchers a theoretical head-ache and has led some, such as Mattuck (1977) to suggest that rather than seek ingenious workarounds, RNG results are probably due to a violation of the 2nd law of thermodynamics. Entropy also provides evidence for an arrow of time: entropy can only increase, therefore time must be uni-directional and we can only progress forwards through it. But the quantum equations are bi-directional in nature, an influence could be exerted as easily backwards through time, as forwards. If an experiment could show that entropy does not *always* increase, and that under some circumstances it could decrease, then the 2nd law could not be used to rebut psi.

Recently - Wang, Sevick, Mittag, Searles & Evans (2002) at the Australian National University published an article in Physics Review Letters showing that they had experimentally violated the 2nd law of thermodynamics. Under fluctuation theorem, the chances of the 2nd law being violated increase as things get smaller, thus researchers used a laser to electrically charge a tiny bead in a water container, trapping it. This container (which also held other uncharged beads) was moved very quickly side to side, and the system was found to take on order for periods slightly less than one tenth of a second implying that entropy decreased during that period.

The point here is twofold; firstly there do exist potential mechanisms which could facilitate psi, these mechanisms have only recently been demonstrated experimentally but they show how psi might operate should it hold quantum roots. Secondly, the 'laws of the universe' arguments against PK are now on much weaker ground, entropy under the right circumstances can be violated, particles can affect each other across space and time. The rejection of PK on theoretical grounds now holds much less legitimacy.

Decision Augmentation Theory

Of course theories that do not utilise quantum effects also exist. We can begin by examining Decision Augmentation Theory (May et al 1995), a derivative of Intuitive Data Sorting (May et al 1985) and the Psi Mediated Instrumental Response Model of Stanford et al (1975). The PMIR model suggested that an organism uses unconscious ESP to garner information about the environment germane to its needs, that facilitate behavioural modification. IDS similarly promotes the idea that individuals use ESP to learn of future events which can then be attended to at useful moments. DAT turns its back on the idea that psychokinetic events are due to 'intent' altering the behaviour of the measuring system, but rather that the system operator, scans the experimental environment and uses precognition to choose a fortuitous time to sample the RNG. It is also teleological in nature; such that the minutiae of the system's behaviour need not be learnt, only the outcome. DAT is ostensibly an experimenter effect, or more accurately it is an effect generated by the system operator. May et al. (1995a) applied the theory to the previous studies from the RNG database, and provided argument that their model better fitted the results than a causal PK mechanism. In 1997 Dobyns & Nelson countered this claim and suggested the results from May et al were a result of 'flawed data categorisation'; they maintained that an influence (causal) model better fitted the data. Debate has continued. It is worth pointing out that DAT cannot explain macro-PK events, but the authors never claim it would.

This does not mean that Decision Augmentation Theory can explain all anomaly. Firstly, the DAT authors made the assumption that any force-like model of PK would operate uniformly over the bit-string, which is not necessarily true. Secondly the use of multiple observers has been shown on occasion to have an effect on outcome, whether that is boosting psi (Feather & Rhine 1969) or inhibiting it (Schmidt 1985). To maintain an ESP explanation, the system operator would have to modify his ESP response in proportion to the numbers of participants and their intention. Thirdly, anomalous deviations require a great deal from the system operator, suggesting experimenters are capable of precognising random outputs, which in itself is remarkable. Furthermore, under protocols whereby RNGs are continuously recording – the experimenter would have to foresee all future events during the lifetime of that sample and choose the right moment to incorporate possibly thousands of defined episodes (see Global Consciousness Project below). One other piece of evidence to trouble DAT comes from experiments where bio-PK protocols are used, for DAT implies that experimenters

utilise natural shifts in physiological arousal – shifts that are conspicuous by their absence in research from non-parapsychological disciplines.

One experiment specifically designed to test the ESP hypothesis was by Braud & Schlitz (1989). In this, an 'influencer' tried to increase and decrease the EDA of a remote target under two conditions. In the first 'multiple opportunities' were provided to utilise IDS, whereas in the second there was only one. Significant psi hitting was only found in the single opportunity condition. These results, suggested the authors, were symptomatic of a causal PK effect, an ESP response should have been facilitated by the greater opportunities afforded by the first condition. In responding to some Bio-PK experiments on red blood cells and electrodermal response, May et al (1995b) acknowledge that they *"imply that there is something unique about living systems"*, and that DAT might not be applicable. The question then, however, is whether one needs two completely separate systems that would appear to generate the same results. Finally, it is much harder to incorporate the results from larger scale measuring systems into DAT – researchers at Princeton built a mechanical cascade device (Dunne, Nelson & Jahn 1988) where 9000 polystyrene balls were dropped and their paths hindered by fixed-position pegs. Under control conditions the distribution was normal, but under experimental conditions where subjects tried to skew the distribution leftwards or rightwards, significant results were found. One must ask how an experimenter could influence the descent of these balls through precognition? Some might argue that local environmental factors such as room temperature, or draughts must be involved, factors which the operator unconsciously incorporates into his precognitive calculation. Similarly, ESP explanations for dice anomaly require 'contentious' variables to be utilised.

Thus it would be fair to conclude that no-one is sure what mechanism underpins mind-matter interactions, anomalous cognition seems to fit the bill under certain circumstances whereas under others causal effects seem more likely. Whatever the case, the dependent variable does seem to show anomaly and for current purposes that will be sufficiently adequate.

Field Consciousness.

Nelson et al (1996) published a paper that reported on RNG investigations across ten 'group situations', including a humour and creativity conference and the council meeting of the Society for

Scientific Exploration. Nelson et al wanted to examine whether these gatherings with their collective cohesive emotions and cognitions would impose some form of directional order on the behaviour of an RNG and termed the investigations "FieldREG": *"In a sense, the name 'FieldREG' thus acquires a double entendre: i.e., the device has been deployed in a "field" situation, to monitor changes in a consciousness 'field.'"* p112.

Since there is no specific intention to alter the REG, any effects presumably stem from the unconscious interaction amongst group attendees, the experimenters and the device. The 'linking' between these various elements has been termed 'resonance' (e.g. Jahn & Dunne 1988, Blasband 2000) or 'function linking' (Morris 1984) between the parties involved.

Results showed that displays of strong group cohesion (as determined by the experimenter) during these gatherings, correlated significantly with anomalous deviations in the REG. Especially significant episodes were recorded during a meeting of researchers investigating Direct Mental and Healing Interactions ($p=0.002$), a ritual gathering of the Covenant of Unitarian Universalist Pagans ($p=0.003$) and a 'deeply engaging' 60 minute episode from a workshop organised by the Academy of Consciousness Studies ($p= 0.00005$).

In the same year Radin, Rebman & Cross (1996), detailed two exploratory FieldREG experiments. The first was in-situ measurements taken at a *Holotropic Breathwork Workshop*, in Las Vegas, Nevada. *"During a breathwork session, participants often experience strong emotions and physical tensions which build up to spontaneous release and resolution."* p147. Data from the experimental condition (some 2.2 million bits of data) was significantly anomalous ($p=0.002$). A control condition, of equal bit length, was not anomalous ($p=0.836$). Although these results seem to indicate that Holotropic Breathwork is conducive to PK, there exists one note of caution. The subjects were informed pre-experiment as to the purpose of the RNG, and the hypothesis that group consciousness could affect it. Thus unconscious demand effects may have been responsible for any significance.

The second experiment used two RNGs spaced 12 miles apart, which independently sampled during the 1995 Oscars Ceremony. The experimenters broke the telecast into one minute segments which they logged as high or low coherence. This coherence reflected their perception of whether the episode was of interest to the viewer. Although the hypothesis that high coherence moments would produce

significant RNG anomalies was not born out, when they looked at the data (post hoc) from both independent RNG systems they found an interesting relationship. There was a 0.934 correlation ($p=4.1 \times 10^{-8}$) between RNG outputs and viewing figures during high coherence episodes, whilst low coherence periods only showed a –0.185 correlation (p=0.476). The authors conclude: *"These correlations suggest, post hoc of course, that the size of the group may be related to the magnitude of the ordering effect."* p163

Two years later, Nelson et al. (1998) expanded their exploratory studies with additional venues. Amongst these were what the authors refer to as 'convivial parties' where 'friends and family' had gathered to celebrate Halloween and a birthday. Overall these get-togethers produced a significant effect where p was 0.049 and the effect size: 0.0102. Conversely, the authors found that people congregating at religious ceremonies (including a memorial service and funeral) did not produce anomaly. Attention was also directed to RNG data around the assassination of Israeli Prime Minister Yitzak Rabin, in what might be considered an event of global importance. Not only was the sample period highly significant (p=0.009) but it also held a relatively large effect size (0.0905). Finally, the authors reported on samples taken during sporting occasions, including college football games and the television broadcast of the 1996 Superbowl. When collapsed, these data combined to produce an 11 million bit sample, that was non-significant (p=0.406). Under binary protocols, PK effects are considered evident when the RNG produces significantly more positive or negative bits. Questions then arise as to whether these biases have any meaning. Does an excess of 'ones' represent a particular element of PK? Does the production of zeros have any inherent value? Any link between direction and meaning has yet to be found, and as Nelson et al. conclude from their data: "[it is] *impossible and inappropriate to infer meaning from the direction of deviations."* p447.

One final FieldREG experiment worth mentioning here was carried out by Dick Bierman in 1996. Bierman reported on data taken from an RNG placed inside the home of a Dutch family, who had reported disturbances synonymous with poltergeist activity. 108 disturbances were logged and found to significantly coincide with anomalous RNG activity. Such data provides support for the hypothesis that poltergeist movements originate from the unconscious PK of closely situated living agents. Bierman also reported on RNG activity taken during a televised football match (when no disturbances were

reported). This also showed significant departures from chance expectancy and implies (as Nelson et al did), that cohesive group experiences might engender PK.

The Global Consciousness Project

Similar in concept to the FieldREG experiments is the Global Consciousness Project (see Nelson 2001). This ongoing scheme took form in August 1998 and now uses over 50 REGs (known as eggs) situated at different sites around the world, with the aim of measuring global anomalies. Data is sampled every second at each of the sites and sent back to be collated in PEAR's laboratory at Princeton University. Researchers look at how egg behaviour changes as global events alter the attention of the world's populations. A registry allows a priori predictions to be made (e.g. 'anomaly will centre around the World Cup final') and scrutinised, whilst unpredicted events are analysed post-hoc (e.g. earthquakes in Turkey, 1999). Results from the GCP purport to show global REG deviations around events that are of universal interest and have included anomalies around the funeral of the Princess of Wales (Nelson 2001), and the terrorist attack on the World Trade Centre on September 11th 2001. The GCP provides evidence that RNG perturbations are not necessarily the result of anomalous cognition and fortuitous sampling, as the eggs are always sampling, and event predictions and means of analysis are always predicted in advance and are not discarded if proved wrong. Thus for ESP to explain multiple event anomalies across a single bit-string episode, suggests that the system operator would have had to have 'calculated' when to initiate a run that incorporated multiple events into an output of unknown length.

BIO PK.

Some researchers have preferred to use biological systems to measure PK in place of physical systems such as dice or RNGs. Two specific examples of biological interaction include William Braud (1990) who reported that subjects were able to slow the hemolysis rate of blood samples through volition and Carroll Nash who reported in 1984 that subjects had successfully influenced the growth of E. coli bacteria through volition. Similarly fungus, yeast and algae and even mammals have also been used as target systems.

Often Bio-PK studies use the physiological response of human agents as the measuring system. Agents are typically asked to influence responses such as Galvanic Skin Response, heart-rate, and blood pressure in separated (non proximal) individuals. A sender will try to influence the autonomic nervous system of an individual for say 30 seconds according to a randomised protocol; control periods involve no interaction and are therefore neutral. This influence can be to raise the nervous response or to calm it, and the periods are counter balanced.

In 1983, William Braud and Marilyn Schlitz (who served as the influencing agent) tried to calm the nervous systems (as represented by electrodermal activity) of 32 removed subjects. Half of these subjects had 'high sympathetic nervous system activity', and were thus expected to prove more susceptible to PK influence than the low activity group. A significant PK effect was witnessed for the high activity group and not the low activity one, represented by a reduction in electrodermal response. In 1963, Charles Tart acted as a sender who was randomly electrically shocked, whilst the physiology of a target person was monitored. The target remained perceptually oblivious (at least in an orthodox sense) to the electric shocks yet responded synchronously in their physiology. Recently, Paul Stevens (2000) reported on a pair of studies that looked at the electrodermal response characteristics of subjects under remote influence protocols (arousal, calm and control periods). Despite the fact that significant (although variable in profile) results showed up on the EDA for calm versus activate moments, Stevens found no evidence that "[influence] *works in a way that is analogous to a response to sensory stimuli"* p406, which would be expected to show a sharp response around 1 to 5 seconds after stimulus presentation.

An ESP hypothesis for PK looks far more precarious when biological PK studies are considered; for to some extent, it relies upon quite large anomalies in the physiology of the receiver to be precognised and selected by the experimenter or sender. The autonomic nervous system tends not to shift naturally without stimulus, thus the idea of a causal effect seems more plausible. Then again, experimental effects may be due to (conscious or unconscious) telepathic communication between sender and receiver, which the receiver acts upon to alter his own physiology via conventional methods (breathing, relaxation).

RNGs and overt emotion.

Richard Blasband (2000) carried out an experiment that looked at the impact 'expressed emotion' (such as 'angry shouting') had upon an RNG. Blasband is a practitioner of Reichian biopsychiatry, a school of therapy propagated by the Austrian psychologist Wilhelm Reich. Reich proposed that the universe was permeated by a life force of orgone energy, and as such: *"Reichian biopsychiatry is a... depth therapy, whose aim is to free the patient from his characterological and muscular armoring, or blocks, thus permitting the free flow of life energy through the organism"* and *"that emotions* [are] *a function of the patient either bioenergetically expanding toward or contracting away from the outer world"* p199 & 197.

Unfortunately efforts to measure orgone prove problematic to all except Reich's most ardent followers. Without wishing to argue on the legitimacy of Reich's legacy, one can concede that the Reichian therapy process is capable of producing powerful emotion within the subject, and as such is of use to the experimental parapsychologist investigating mood effects. Reich proposed that blocked emotions could be released through the relief of muscular tension (via massage and verbal exchange), and that different emotions had different effects on the body's bioelectricity; anger was associated with bioelectricity moving outwards from the body core, whilst sadness was associated with movement towards the core. The task of the therapist is to overcome the patients 'blocking', their natural tendency to inhibit emotional expression.

Testing 12 participants, Blasband engaged in normal therapeutic treatment, but also acted as operator to a proximally placed RNG, sampling at 200 bits per second. Recording episodes were 13 minutes long, and within these episodes were marked emotional epochs, defined by subjects overtly displaying emotion, (not just reporting a perception/feeling of it) as noted by Blasband.

Blasband analysed three conditions, and their impact upon the RNG output - neutral talking which culminated in a terminal Stouffer Z = +1.20, anger (+3.55) and anxious crying (-4.47). These results showed that the direction of RNG deviation was linked with emotion, with anger deviating 'upwards' and anxious crying 'downwards', in apparent contradiction to Nelson et al's belief that it is inappropriate to gauge meaning from direction. Furthermore the data curves for each RNG condition

remain fairly constant, meaning that the effect is coming across the majority of trials although neither anger nor anxious crying became significant effects until some 5000 cycles had been run. Although the terminal SZ score of –4.47 is massively significant (p=0.000004, 1 tail), this was primarily a result of nearly 65,000 cycles of data (13 million bits) being collected. Blasband went on and provided his explanation of the results: *"My current working hypothesis is the investigator, patient and REG cofunction in a state of resonance* [non electromagnetic field which links parts, such as people and equipment] *and that the REG output is a manifestation of the functional unity of the triad".* p214

Micro PK and mental state.

Gissurarson (1992) provided an extensive review of PK-conducive states and the reader is directed to his article for an in-depth analysis. Herein however, some of the main research points can be considered. Firstly, the use of meditative states has been investigated fairly extensively as there is some credence that meditators are able to exert superior control over their mental states. Matas & Pantas (1972) recruited 50 subjects, half of whom were practitioners of meditation and had been engaged in meditation for at least 6 months whilst the second group was made up of individuals who had no experience with meditation. A PK feedback protocol (illuminated lamps) was employed. Matas & Pantas failed to find any significant scoring effects with the non-meditators. However, meditators did score significantly (3298 hits, and 3102 misses) which corresponded to a CR of 2.45, and a p value of less than 0.02. This anomalous effect was reportedly not due to any star performances, rather it drew from across the subject pool.

Schmidt & Schlitz (1989), used pre-recorded PK targets, in the form of melodic and noise periods, presented by audiotape. Over five hundred participants completed between 1 and 9 trials each, wherein they listened to the tapes and tried to lengthen the melody periods and shorten the noise periods. It was found that meditators produced a highly significant PK effect whilst non-meditators produced null results, the intergroup difference resulted in a p of 0.00074. With the use of pre-recorded PK targets, subjects are ostensibly asked to influence a pre-recorded event, an event that has already taken place. Other studies have also shown that PK can exert an effect backwards through time and across space, and the phenomenon is termed retroactive-Psychokinesis (retro-PK).

Feedback

In 1975, Honorton & May tested 10 subjects providing them with auditory and visual feedback (deflection on a polygraph-type graph) as to their PK functioning. Under the high-aim condition, subjects were instructed to deflect the polygraph pen as much as possible in a given direction, and chance expectancy predicted an effect 50% of the time. In fact, the high aim condition corresponded to a success rate - 51.92% of the time (p=0.009, one tailed). The study also reported a decline effect, which was also uncovered in later studies by Honorton & May (1976) and Winnett & Honorton (1977). It may be worth considering here, that since Charles Honorton was the common factor in each of the cited experiments, psi effects may have derived from his unconscious.

Braud (1978) employed a lengthy procedure that used a RNG to activate the recording of relaxing and activating sound segments. Under a ganzfeld procedure, 10 subjects had GSR measures taken which were watched in real time by the experimenter. When the experimenter heard the randomly generated sounds, he tried to influence the GSR of the subject through PK, relaxing the subject at particular moments, arousing him at others. In relation to the RNG, significantly greater numbers of relaxing episodes were generated than activating ones. Likewise false feedback may also generate effects - a study by Isaacs (1981) seemed to confirm such this view, when artificially created noise pulses, perceived by the subject to be due to PK, induced genuine PK effects.

Although such studies have shown that feedback can prove useful, the consensus is that it is not a pre-requisite to PK, (e.g. Honorton, 1977); indeed one runs the risk that feedback offers a communications channel that is unavailable in the real world, thus diminishing the generalisability and ecological validity of such studies.

Micro-PK and belief

The role of 'belief' is one area that has attracted serious commentary through the years. The sheep/goat divergence (Schmeidler & McConnell 1958) refers to an individual's overall belief in the existence of psi. ESP research has tended to show that believers (sheep) tend to score above chance, and non-believers at a null level. A 1993 meta-analysis by Tony Lawrence into the sheep/goat ESP database, looked at 73 forced choice studies over 45 years, and yielded an overall effect size of 0.029 with $p=1.33 \times 10^{-16}$. Previously, John Palmer (1971) had reviewed research and found the sheep/goat

dichotomy was significant in the expected direction and that no reversals approached significant levels. Fewer studies have looked at belief and psychokinesis - Gissurarson and Morris (1990) found a post hoc link between PK scoring and goats in an imagery condition. Later Gissurarson & Morris (1991) evaluated six questionnaires, including the Locus of Control Scale and the Vividness of Visual Imagery Questionnaire, and found a positive correlation between PK scores and a sheep/goat measure. In addition both Rubin & Honorton (1972) and Debra Weiner (1982) have reported positive correlations between PK and belief.

Kenneth Batcheldor (e.g. 1984) has preferred to focus on the role of *short-term* belief as a predictor to psi functioning: does an individual feel capable of producing psi, at that moment, on demand? Intuitively, such an idea seems reasonable, if an individual does not think of PK as valid, would that not serve to inhibit the appearance of any effect? As Batcheldor explained: *"What seems to matter is the balance of belief over doubt at the very instant when a PK event is about to occur, rather than the long-term attitude of belief or doubt that exists before the sitting commences." p108.*

The 'relaxed atmosphere' at sitter group inductions, can be married to the work of other researchers into psi conducive states. Debes & Morris (1982) found psi hitting with relaxed non-competitive subjects and psi missing for active competitive subjects. Faithorn et al. (1988) posited that White (1964) felt serious relaxation coupled to a will to succeed was facilitative, a strategy referred to as "effortless effort". Likewise Braud & Braud (1978, 1979) decreed passive volition as psi conducive, whilst Carpenter (1968) advocated that subjects should engage in energetic rather than dull mental states.

Mood.

Studies into mood and psi functioning have typically produced inconsistent results, and the reader is pointed towards the Osis & Carlson report (1972) for a summary of early findings, and Schmeidler (1988) for further findings on mood and psi. Nonetheless, Braud Wood & Braud (1975) carried out a free response GESP whereby 20 subjects were divided into 2 conditions, a ganzfeld condition to promote psi-hitting, and a control group. A copy of Braud & Braud's (1974) questionnaire was administered that incorporated mood and belief components. Although psi hitting was evident in the

ganzfeld condition and the control group showed chance results, there were no major differences between the groups in terms of their questionnaire data, although the authors went on to emphasise the importance of investigating the psychological components of psi functioning. Milton (1985) reported higher ESP scoring for unpleasant moods in the Ganzfeld than for pleasant ones.

Sargent et al (1982) used a Ganzfeld free response protocol to test 16 experienced and 16 naïve subjects, Data from the experienced subjects was independently significant, whilst the naïve condition was not. Subjects completed a questionnaire that contained a bipolar scale for mood (very good to very bad) but no significant findings were revealed. Similarly Von Lucadou et al. (1987) examined whether mood was a factor in the influencing of a strontium-90 sourced RNG, and also found null results. In two separate PK experiments with 3 and 6 subjects respectively, Andre Eve (1972) found positive PK but no link with mood, whilst Mussig & Dean (1967) failed to find a relationship between precognition scoring and mood.

In 1991, James Carpenter ran 383 subjects through 3 studies looking into forced choice precognition. These studies incorporated newly created mood scales that led to Carpenter to putting forward characteristics that were felt to be psi conducive. The items predicting psi hitting (in descending order) were forceful, masterful, drifting and amiable; whilst those predicting psi missing were bashful and adaptable. Carpenter reported additionally, that anxiety diminished psi hitting and that subject performance was correlated with the sheep/goat divergence.

In 1976 a single subject who had undergone 24 psychoanalytic therapy sessions, was tested by Hudesman & Schmeidler, under an ESP protocol where hand positions on a clock-face had to be matched with a target set. Before and after each trial, the Nowliss Mood Adjective Checklist was completed and it was found that mood change significantly correlated with ESP scoring ($r=0.84$, $p=0.06$). As the authors surmised: *"ESP success was less when he* [the subject] *felt more depressed, and was greater when he felt hostile as expressed by higher scores for aggression, skepticism, and impatience, and lower scores for social affection."* p378.

Sara Feather & Louisa Rhine (1969) carried out a dice PK experiment, using a mother and daughter pair. Half the rolls were in co-operation and half were in competition. When the subjects were in competition, negative mood was associated with reduced PK scoring. However data from the co-operation condition negated this effect once the scores were collapsed. Interestingly, when only one subject was in a negative mood, PK functioning was reduced across both subjects: *"The second subject was not aware of any mood change as the result of her colleague's mood; yet, the close association of a person (who happened to be her daughter) in a negative mood must have been cause enough for her own negative PK scores in this instance."* p226.

Alan Price (1973) conducted an ESP test using subjects with differing imagery strategies, using concealed erotic and non-erotic targets and made what he termed a 'fortuitous' observation. The mood of his assistant when preparing the targets correlated with the ESP scoring. On the third day of target preparation, the assistant considered herself to be in a very negative mood and scoring on the non-erotic targets prepared by this assistant on this day, proved highly significant ($p<0.003$). Such results raise questions as to the psi effects from third parties, could their psi infuse the target material or the subject?

Rogers (1966) looked at ESP run score variance when acting as subject in positive and negative affective states. He found negative state affect produced significantly smaller than expected variance and positive state roughly chance variance, intergroup variance differences were significant. Nielsen (1956) asked 8 subjects to rate their state-mood after they had completed an ESP task but before they were informed as to their results. The mood rating took three parts (physical vitality, emotional vitality and mental vitality), and Nielsen found that when subjects were consistent across these three parts in either the positive or negative mood conditions, scoring was significant. When the subjects were less consistent across these measures, scoring was at chance levels. Finally, Mischo & Weis (1973) carried out a PK experiment looking at normal and frustrated moods, and personality traits. The results were complex, however it seemed that frustrated individuals who were depressed or neurotic achieved lower PK scores, whilst frustration on calmer, sociable participants produced higher PK scores.

In addition, Parra & Villanueva (2003) conducted a 30 subject, Ganzfeld-based experiment that looked at the link between extroversion and neuroticism and ESP scoring. Part of the study incorporated a pre-trial questionnaire that measured relaxation level, expectation of success, motivation and *"mood state before the experience (from bad to very good)"*, the researchers found no significant effect between any of the 4 variables and ESP scores.

Thus the data from ESP studies seem to indicate that relaxed mood states facilitate psi, whilst PK requires active (often negative) emotion.

Retro-PK

Mention was made earlier in the chapter to retro-PK and various protocols exist to test retro-PK. In one example, randomly generated clicks are recorded onto 2 audio-tapes one of which is retained by the experimenter, the other sent to a subject. The subject then listens to the tape and tries to produce more clicks in one channel than the other. The RNG is set up to operate automatically so that nobody knows its outcome until the tape is first listened to by the subject. In 1986, Schmidt, Morris & Rudolph, partially used this methodology, and using sceptical subjects found significant psi hitting ($p=0.0032$).

A benefit of presenting previously recorded targets is that experimenters are able to present the feedback of the event on multiple occasions. Schmidt (1976) found that when the feedback was presented 4 times (sequentially) increased scoring was facilitated (52.95, $p=0.0005$) than where 'momentarily generated targets' were presented (50.815). Both conditions were significantly higher than the m.c.e. figure of 50.00. Schmidt went on to write: *"This may bias us toward the view that what matters for the outcome of the test is not the physical-psychological conditions at the time of the target generation, but rather the conditions at the time of replay during the test session."* p285.

Alternative protocols to audio presentations can also be employed. In one scenario, an RNG is coupled to an interface that graphically displays the system's behaviour. The binary output is represented as separate columns (heads and tails), or as a graph with a positive and negative y-axis. Once again the recording process is automated and nobody witnesses the system outcome at the time it is recorded onto video tape. The experimenter then takes the unwatched tape and locks it away for a period of time.

Later, at some future stage, a subject is recruited to mentally influence the event, using the graphical output from the videotape as feedback and a randomised protocol instructs the subject which of the binary outputs to aim for. In a variation on retro-PK experiments, Schmidt (1997) moved away from using RNGs as target systems and successfully influenced the breathing cycle of a physically separated person.

Debate remains as to what mechanism is at work. Since the event is physically unobserved until the viewing, it may be that the quantum collapse has not yet occurred. By watching the tape, consciousness could extend backwards through time and force a quantum collapse, fixing the episode. Alternatively, the subject influences the properties of the tape itself, which correspondingly alters any experimenter's copy. Then again, the experimenter (or for that matter the subject) might use ESP (under IDS or DAT) to locate positive results, and simply chooses the right moment to activate the RNG and Video units. Some research has shown however that, should the RNG data be viewed firstly by someone who does not seek to influence it, no future attempts to exert anomaly can change the outcome, i.e. the retro-PK effect gets blocked (Schmidt 1985). In addition to this trans-temporal effect, there also appears to be no diminishment of effect with regard to physical distance between subject and device.

Alongside research into micro-PK, the researcher can turn towards the macro-PK literature for insight on the interaction between mood and large scale psi functioning.

Nina Kulagina.

Brief mention should be made here of Nina Kulagina, popularly reported as the star psychic from Leningrad, Russia. Reports from the day (e.g. Ullman, 1974), reported that Kulagina was able to move small objects (up to 30 grams) on the table in front of her, was once able to separate the yolk from the albumen in an egg and most interestingly was able to stop a frog's heart beating. Several caveats should be considered. Firstly, these experiments took place at a time when controls were far less effective than they might have been, although the investigators who tested her were adamant that they could find no fraud, nor suspected any. Secondly, there may have been some political mileage in the Cold War age, for the Russians to find superstar psychics such as Kulagina. Despite these 'uncertainties', data from Kulagina may signpost some direction in the study of PK and emotion. It

seems that when Kulagina attempted to produce PK, her physiology entered a state that was likened to rage, with elevated heart-rate and blood pressure. Indeed the physical stresses upon her body were so intense that Kulagina would end up physically exhausted after testing and ultimately she was reported to have suffered two heart attacks which concluded the research programme. If these reports are taken at face value, they suggest that PK functioning might benefit from the induction of energetic purposeful 'angry' mental states.

Further examples of allegedly macro sized effects can be found in the sitter-group trials of Kenneth Batcheldor (e.g. 1966) and Colin Brookes-Smith (e.g. 1973). Within these trials, lively and convivial atmospheres were contrived that enabled subjects to successfully levitate the table around which the sitters sat and placed their hands. Batcheldor attributed these successes, to the overcoming of 'ownership resistance' (whereby a person's PK is inhibited if they believe they are the source).

RSPK.

Several well documented poltergeist cases seem to show how unconscious PK originating from young adolescents may account for the phenomena. The preferred terminology of RSPK, (Recurrent Spontaneous Psychokinesis), was first used in a report into unexplained movements of household objects in a house in Seaford, Long Island. (Pratt & Roll 1958). In this case, activity appeared to centre around a 12 year old boy, Michael Lessing, who was subsequently examined by Gertrude Schmeidler, Roll & Persinger later wrote:

"When she examined the Rorschach responses, Dr Schmeidler found overt aggression but no evidence of habitual, sophisticated fraud. When she showed the protocol to a colloquium of clinical psychologists "who were not markedly sympathetic to the PK hypothesis," the consensus was more consistent with the eruption of spontaneous, unconscious, depersonalised violence than with the clever conscious manipulation of hostile actions" by Roll & Persinger in Houran & Lange (2001) p 303

A separate case revolved around Arnold Brooks, a thirteen year old boy who lived in Newark, and whose home was at the centre of a poltergeist outbreak investigated by William Roll (1969). Arnold lived with his grandmother with whom he did not get on, such that psychiatric evaluations of the time

found highly inflated levels of aggression towards her. It is suggested that the poltergeist activity was Arnold's unconscious response to the environment, created to provoke an exit from the home.

In one final, and possibly the best known RSPK example, poltergeist activity was associated with Julio Vasquez, a 19 year old Cuban refugee who worked in a Floridian Warehouse. (See Roll & Pratt, 1971 and Roll 1972). The warehouse contained tourist souvenirs which were reported to move anomalously and smash, when Julio was around. Due to the regularity of the outbreaks (over 200 incidents were recorded), Roll was able to set up target objects for the 'poltergeist' to move. The poltergeist duly obliged, but only when Julio was proximal. It was also reported that within Julio's psyche manifested anxiety, rebellion, anger and some suicidal tendencies – stoked by a dysfunctional relationship with his stepmother, a woman who wanted Julio to move out of home. Indeed psychiatrist, John Altrocchi, concluded that alongside Julio's anger existed feelings of social exclusion and a strong belief that life had mistreated him. When Julio was asked by William Roll, how the strange goings on in the warehouse made him feel, he replied that they made him happy, each one taking 'some weight off his shoulder', but was unsure as to why. When these reports are taken in conjunction, it seems sensible to concur with Roll and Persinger who write: *" It is our opinion that anger is a factor in most cases of RSPK... "* and that *"RSPK is an expression that reflects the agents' relationship, positive or negative, with people who play important parts in their lives. RSPK may begin as a hostile reaction but can change to a positive response when the social environment becomes supportive."* (Roll & Persinger, 2001, p136 and 137). Roll (1977) has speculatively suggested that the high incidence amongst RSPK agents of both dissociation and epilepsy, may in some way be linked to PK functioning.

If one is to look critically at the phenomenon of poltergeist activity, it seems obvious to point out that other explanations such as fraud, misperception and (potentially) discarnate spirits deserve consideration and could explain anomalies. But moving away from these alternatives and focusing upon the psychokinetic theme of this thesis as a whole, it would be helpful to look critically at the RSPK hypothesis. Both Martinez-Taboas (1984) and Irwin (1994) have provided considered criticisms of RSPK theory and the reader is directed to their articles for in-depth analysis. Nonetheless the main points are summarised and discussed below.

One of the main criticisms with RSPK case histories is that diagnosing psychiatrists were not blind to the subject's potential role in any poltergeist outbreak, and were potentially more open to the idea that psychopathology was present. As Martinez-Taboas makes clear: *"Controlled clinical studies with adults and children have indicated that a clinician is predisposed to 'see' or 'encounter' 'psychopathology' in normal people if they have the expectation that the person they will evaluate is a 'patient'".* (1984, p56). Furthermore *"... investigators seem to underestimate the powerful and persuasive influence that expectancies and biased inferences produce in a psychodiagnostician who is not blind."* (p58). Firstly the implicit suggestion that bias would operate solely in favour of an RSPK hypothesis is flawed, it may well be that once aware of the relevant circumstances, clinicians' prejudice and bias may just as well have operated in the opposite direction. Secondly, it should be pointed out that once Martinez's line of reasoning is taken to its logical conclusion, the integrity and legitimacy of *all* non-blind psychiatric evaluations, no matter how mundane needs to be queried.

The next point to consider is the lack of specific control data. As Irwin (1994) asks: *"Are poltergeist agents really in the grip of psychological conflict? Survey data to this effect actually are inconclusive because control subjects have not been surveyed; thus one might well find similar levels of conflict reported by people (especially adolescents) who are not poltergeist agents"* Irwin 1994, p203. Some counterpoints to this position can be considered here. Firstly it may well be that other people hold similar levels of conflict and are not poltergeist agents, but this accordingly does not rule out the legitimacy of the diagnosis. Other individual differences may need to combine to produce an effect. Additionally, although there is no control data, the diagnostic process obviously relies implicitly upon the psychiatrist's comparison of a given patient with others with whom they are familiar, including the 'normal' population – a process that, under regular psychiatric diagnosis is considered legitimate.

Both Irwin and Martinez criticised the use of projective tests, which were commonly employed during the diagnosis sessions, and both are correct in pointing out that these tests (e.g. Rorschach) have little validity or reliability. Nonetheless, it should be noted that projective tests are *part* of the diagnostic process, not *the* diagnostic process, and under the right circumstances offer some insight.

One final point surrounds suspected RSPK agents and tests under laboratory conditions. Roll (1977) reported that 'only' 3 out of 6 studies with such agents produced significant performances. One might say it is unfair to criticise the RSPK hypothesis on the basis of this. As poltergeist anomaly is considered in part a manifestation of blocked release towards authority figures within the RSPK environment, it seems obvious that testing under alternative/dissimilar conditions could fail to recreate the psychological set required to produce an effect.

The repressed anger and resentment diagnoses were highly specific to subjects in poltergeist cases, and no similar findings during psychiatric evaluations of people who reported hauntings have been reported. Overall it may well be that bias did have some contributory effects during the diagnosis of RSPK agents but these are unlikely to account for the effect as a whole. What these cases seem to strongly show is that an inability to release pent-up emotion seems to prove fundamental to RSPK, and that RSPK activity provides relief for the individual. Effects tend to be localised because the individual typically seeks to escape from 'problems' associated with that specific environment.

From the review above it would seem that emotional states (especially anger) may have some effect upon psi functioning. Thus one needs to ask - what is emotion? Under the James-Lange theory, emotion is fundamentally the physiological response to a stimulus felt by a percipient. Imagine an event that triggers the sensation of happiness, it is this state of arousal and intensity that emotion corresponds to. Theorists such as Schacter & Singer (1962) considered the James-Lange approach lacking and added a cognitive component whereby the percipient evaluates why their physiology is in such a state before assigning an emotion to it. For example, fear and excitement are considered separate states yet hold physiological similarity, Schacter & Singer argued that an attribution is required to differentiate between them: fear might derive from a perceived threat, whilst excitement stems from the anticipation of a reward. In an extension of this cognitive position, Lazarus (1982) has even gone so far as to play down the perceptual component to such a degree, that (he argues) emotional experience is entirely derived from cognition. Plutchik (1980), on the other hand has pointed out that *"So-called 'cognitive' approaches to emotion are mainly concerned with the identification of variables that influence the evaluation process in humans, but it should be emphasised that an evaluation is not an emotion."* p9.

Thus, the two 'hard' positions of emotion lead to the concepts of emotion as either a product of cognition or, a separate evaluative mechanism (outside the realm of orthodox cognition and awareness). Robert Zajonc (1980, 1984) has argued that emotion is a separate system to cognition because affect has primacy over cognition. Zajonc explained that people can respond to stimuli before cognition has had an opportunity to process any stimulus, suggesting that emotion is a rapid means of evaluation separate from cognition, (see Zajonc 2000 for empirical support). As mentioned above Lazarus holds an opposing view and states that any response is due to earlier primitive means of cognitive processing. It seems fair to point out that even basic sensory responses require some form of 'brain processing' and thus Lazarus is right when putting forward the idea that processing has to take place in response to a stimulus. Put simply, the two positions boil down to defining the level of processing the mind has to complete before it is considered cognitive. If the definition is that 'any' processing is cognitive then the cognitive approach is unimpeachable. As will be seen later, attempts to

bridge the two positions have met with some success, and Zajonc has recently indicated a desire to close the debate (again see Zajonc 2000). But in the meantime it is necessary to use a definition of emotion that does not imply any specific mechanism. To do so I shall borrow from Ortony, Clore & Collins (1988) who define emotions as *"valenced reactions to events, agents, or objects, with their particular nature being determined by the way in which the eliciting stimulus is constructed."* p13.

Byrne and Clore (1970), have suggested that emotion may be a fundamentally learned response, that through conditioning principles people learn to respond to stimuli in predictable ways and similarly Buck (1991) has made clear: *"The capacity to experience and express the affects is innate and unlearned, but the circumstances under which they are experienced, and the ways in which they are expressed, are learned."*. p103. Some support would appear to come from Mandler (1991), (an advocate of the role of consciousness in the generation of emotion), who cites anthropological data on the Semai people of Malaysia. It appears that the Semai do not have the emotion of anger in their society as it is never acknowledged. Conversely, if emotion was a learned response, mediated through conditioning, then one would expect temporal and spatial contiguity between stimulus and response, and extinction in the absence of reinforcement, yet studies (e.g. Forgas & Bower 1988) have shown that emotion can effect judgements under non-contiguous circumstances.

Where theorists seem somewhat more united is in explaining why we have emotion. Daniel Dennett (1991) has proposed that brains are 'anticipation machines', planning progress in their environment. Any means of evaluating that progress would provide a feedback loop that could lead to further changes. Similarly Carver & Scheier (1999) also see emotion as adaptive, providing information that modifies goal achievement. Trivers (1971) meanwhile has considered emotion in terms of reciprocal altruism, where an organism will share a resource with another in the expectation of a future payoff. The main problem with this approach is that there needs to be some form of accurate evaluation of character, or enforcement; otherwise individual organisms (defectors) might never co-operate in future circumstances. The primary enforcement strategy of tit-for-tat sees individuals repaying an individual in kind, and there would be a certain amount of utility in identifying defectors. Trivers suggests that the existence of defectors naturally led to a need and subsequent ability to evaluate the character of others, and from this pressure came other evolved further emotions such moralistic anger and guilt.

Additionally one might argue that emotion evolved to mark episodes of cheating in memory particularly strongly. Mood congruence (as discussed below) would ensure that negative feeling would arise upon recollection of the previous behaviour of a defector. Both approaches suggest affect specifically evolved as a way of avoiding victimisation.

Robert Plutchik (1980) has put forward a psychoevolutionary theory of emotion which postulates that emotions are adaptive means of mediating behaviour pertinent to events in an organism's world, both in terms of providing communication and boosting an individual's chances of survival. Emotions can be applied to species other than human beings and can take on different forms of expression in these other species. In other words emotions are a direct result of the evolutionary need to preserve and pass on genes. The behavioural modifications and reactions brought about by an emotional episodes can facilitate a rapid modification of autonomic processing, physiology, attention and cognition and as such one might ask whether there are a set of basic, primitive emotions.

As with many fields of psychology (e.g. intelligence), there is no universal agreement as to what these basic emotions are, and linguistic imprecision clouds the truth, for Ortony & Turner, 1990 write: *"... the same emotion is often labelled differently by different researchers. Some theorists use the term anger and others the word rage while presumably referring to the same emotion; some speak of fear whereas others speak of anxiety; and the same emotion may be labelled happiness by one author, joy for another, and elation by yet another."* p315. These same problems of language dog phenomenological approaches with the inherent issues of subjectivity and idiosyncrasy. One of the ways to circumvent these problems, is to utilise the approach of theorists (e.g. Ekman, Friesen & Ellsworth 1972, Ekman 1993) who propose that the basic emotions can be identified through universal facial expressions, from which - anger, disgust, fear, joy, sadness and surprise are derived. Although such an approach seems valid, one could argue that as these expressions must be a physical manifestation of biological hardwiring, and as such are merely an extra layer for the researcher to cut through. After all, each of the six emotional expressions defined, may be derivatives of a yet simpler system. But where the approach struggles most is with universally recognised facial expressions that are not due to emotion. The expression of surprise for example, is recognised throughout the world and should therefore make it a basic emotion. However, surprise is considered by many researchers to be a

cognitive evaluation, derived from a clash between expectation and an actual outcome, and it is this cognitive component which negates its status as an emotion. Overall therefore, there seems some prudence in concluding that facial expressions may simply be a characteristic of emotion. Nonetheless facial expression recognition is important, Dodge and Feldman (1990) have written how a failure to recognise facially expressed emotion can lead to social rejection, as unsuitable behaviour is not moderated according to circumstance. It is also the case that on occasion a heightened sensitivity to perceived affect in others might unearth hidden emotion, again jeopardising any relationship. Likewise there are times when withholding emotion (poker face) is the most sensible course of action, and an inability to do so effectively results in negative outcomes.

The idea that emotion can be understood by brain activity has a long pedigree from Papez (brain circuit) to the work of Paul McLean (the limbic system). Looking to brain circuitry still has prominent contemporary supporters, including Carroll Izard and Silvan Tomkins (who, suggests defining emotion by the density of neuronal firings). Others such as Jaak Panksepp (2000) endorse approaches that look for specialised neural circuitry, an approach that is beginning to bear fruit (see chapter 3). Whilst neurophysiological techniques provide some answers as to what emotion is, they suffer from a common fault, namely that reducing an experience to the nuts and bolts of neurons and neurochemicals provides a very limited understanding of the experience. Thus it seems that after all, there may be some need for a multi-factorial approach, incorporating biology, phenomenology and expressions of behaviour. Going back to the question asked at the start of this section – how many basic emotions are there? The answer is somewhere between two, the behaviourist friendly pain and pleasure, as per Mowrer (1960) and the somewhat more extensive ten, that Izard (1971) advocated. For the purposes of this thesis, it seems legitimate to summarise that sadness, anger, fear, disgust and happiness occupy most theorists' lists.

Whilst expending time and energy discussing primitives, an important point arises; does it really matter whether an emotion is considered basic or not? Happiness is distinct from sadness certainly, but it is also distinct from guilt, embarrassment and anxiety. These 'blended' emotional states are no less powerful or meaningful to an organism, and in reality emotions often correlate with each other, (e.g. depression and anxiety between 0.5 and 0.8 (Klinger, 1997). After all it is these blends that represent real world states, perhaps a pure emotional state can only be considered as a hypothetical construct? As

Ortony and Turner (1990) point out: *"Thus the question "Which are the basic emotions?" is not only the one that probably cannot be answered, it is a misdirected question, as though we asked, "Which are the basic people?" and hoped to get a reply that would explain human diversity."* (p329).

Although Ortony and Turner have a valid point, it may be that from the parapsychological perspective, basic emotions offer most insight into PK functioning. Firstly, the manipulation of subjects into purer mental states may help reduce inhibitory and confounding variables. Secondly, the purer the state, the more *intense* the feeling, which as noted from some of the previous literature, may facilitate larger and more tangible effects.

Costs and Benefits

The effect of emotion on the body's psychological and physiological systems, sees adjustments to the organism's attention, motivation and physical state via muscle action, endochrine secretion, blood flow and skeletal position. A physical response outside of conscious control enables a rapid evaluation of the environment and the organism's decision-making made therein (e.g. Zajonc 1980). Emotion provides the organism with a set of heuristics, to deal with situations. To an extent this is based on experience, such that should an interaction generate joy, then it becomes associated with benefits to the organism. Likewise the generation of negativity becomes associated with costs. Between happiness and sadness, it is the generation of subjective distress that is most useful, as sadness informs the percipient of loss and can be viewed as an event marker alerting the organism to problem sources. Once these sources have been identified, the associated processes of memory and cognition can be activated to ameliorate the situation. Without wishing to overstate the case, it is *negative* emotion that response is geared around, as Taylor (1991) explains, *"Negative events evoke stronger and more rapid bodily, cognitive and emotional reactions than neutral or positive ones"* p67.

Stein & Levine (1989) conducted a study with young child subjects to examine responses to positive emotion. They found that maintaining and enjoying the emotion was particularly prevalent, lending support to the idea that positive emotions can be enjoyed at leisure because they provide no short-term impetus to modify behaviour: *"Happiness was elicited by goal success and was followed by plans to maintain or enjoy current goal states... Anger or sadness were elicited by goal failure and were followed by plans to reinstate, replace or forfeit goals."* p343 In fact happiness can almost be

negatively defined as a state whereby subjective distress has been minimised. Furthermore, happiness primarily stems from some sort of gain, which probably means a cost has been inflicted elsewhere. Consider a career promotion, or winning a tennis match, or even falling in love. Each of these situations has seen you benefit at another's expense - whether a co-worker, a tangible opponent (across the net) or simply an unknown rival (whom your partner has chosen *not* to commit to). The cost/benefit relationship sometimes sees individuals revel in the misfortune of others (schadenfreude) whom they do not know, or under situations where there is no net benefit.

As touched upon, maybe the single greatest benefit of emotion, is its speed. Environments can be 'noisy' and 'considered' cognitive evaluations could prove too slow and inefficient for effective responses. When we recognise the demeanour of an angry man, a swift fear response, generated by an increased perception of risk, is the most judicious way forward. It is this rapid feedback upon which short term emotion depends, we evaluate other's responses to our behaviour and modify ours according to the goals we have set. The speed of many emotional responses suggest that cognition has a very limited part to play, for as Rosenthal (2002) writes: *"Often we experience emotions physically before we become aware of them and well before we decide to act on them."* p17. For survival speed is of the essence, as hazardous situations need to be resolved as quickly as possible, and a failure to act swiftly could jeopardise life.

The physiology of emotion

As mention has been made of the usefulness of fear, it is worth mentioning that a sizeable corpus of experimental research into the emotion of fear in animals exists, due to its relatively easy induction through classical conditioning. As Rogan & LeDoux (1996) explained: *"Studies of fear conditioning may therefore be useful in identifying basic mechanisms of learning and memory as well as emotion. The fact that fear conditioning is a rapidly acquired and long lasting form of memory makes it especially attractive in this regard."* Whilst behaviourist concepts of reward and punishment underlying behaviour may have been quietened in many areas of psychology, they still hold significant sway in some quarters of neuroscience, especially in the production of emotion. (e.g. Rolls 1990).

Traditionally, the physiological structure underpinning emotion was believed to be an integrated, universal system (MacLean 1952), with much interest directed towards the limbic system (part of the 'old brain' in an evolutionary sense). Within the limbic system resides the amygdala, which as Davidson & Irwin (1999) point out: "*...has been consistently identified as playing a crucial role in both the perception of emotional cues and the production of emotional responses, with some evidence suggesting that it is particularly involved with fear-related negative affect.*"

Much research has shown the amygdala has a fundamental role in fear production (E.g. Labar, Gatenby, Gore, LeDoux & Phelps (1998), Morris, Ohman & Dolan (1998) and that the amygdala helps to enhance the strength of an emotional effect for long term memory. E.g. (Cahill & McGaugh, 1998). This has led to the somewhat hasty view from some quarters that the amygdala is involved with all negative emotion. Latterly, researchers such as Ledoux (1991) have posited that support for the limbic system as a universal emotion generator has been taken too far and prefer to echo research that suggests dedicated neural circuitry exists for each emotion. Similarly a 'sadness' study from Lane et al (1997) found *"Recalled sadness was associated with increased activation in the anterior insula. Happiness was distinguished from sadness by greater activity in the vicinity of ventral mesial frontal cortex"*. The fact that happiness was distinguishable is interesting because, according to George et al (1995) studies into 'happy state' activation have typically failed to find any notable patterns. This specialisation has even been shown to exist between sexes, e.g. when asked to recall an episode that made them sad, women have been shown to display bilateral inferior *and* orbitofrontal activation, whereas men display mainly left-sided activation (Pardo, Pardo, & Raichle 1993).

Anger

Mandler (1984) amongst others has proposed that anger arises whenever there is an interruption to teleological behaviour. Likewise, David Buss (2000) has suggested that anger arises from strategic interference which *"occurs when a person's goals, or methods of achieving goals, are impeded or blocked"*. He goes on to point out that the episodes most likely to rile individuals tend to have evolutionary consequences - women become angry at the thought of sexual aggression; whereas men become angry if subjected to false sexual signalling. Behavioural responses are commonly geared to overcome these blocks, through confrontation and retaliation as a failure to respond suggests weakness and can embolden rivals to seize further advantages. Averill (1982) considered anger a biological

relative to aggression that sought to correct a sense of being wronged, upholding sociocultural standards of behaviour. Averill argues that since humans naturally seek to generate and follow rules, for example with language, there is an inherent tendency to become angry should rules get broken, especially when these rules hold cultural importance. Aside from behavioural responses anger can also modify judgements on causal interactions, for example Keltner, Ellsworth, Edwards (1993) showed how angry subjects attributed a romantic mishap (presented ambiguously) as being caused by a human agent, whilst sad subjects considered it situational. Such outcomes are common in real world experiences where angry individuals tend to search for 'someone to blame'.

When anger spills into violent aggression (physical violence or outbursts), Zillmann (1997) has postulated that it is rarely the result of one big issue, rather outbursts stem from a collection of smaller altercations, or as Zillmann puts it: *"incessant provocation that characteristically starts with trivial disagreements"* p371. These provocations foster intense feeling, strengthening the associative connections between the 'issue at hand' and the emotional response. This can explain how apparently disproportionate responses can unfurl from minor disagreements – residue from previous arguments gets incorporated into the mix, resulting in a cumulative response directed at the party deemed responsible. Conflict triggers derive from how individuals perceive the conflict, and are especially likely when people feel unfairly treated, or demeaned, and their status is jeopardised. Zillmann goes on to say that activity in the sympathetic nervous system *"is the critical factor in determining the experiential intensity of anger"* p373. With an 'anger response', heart rate and blood pressure are both raised and the adrenomedulary system empowers an energised fight or flight response. A heightened state of arousal in the adrenocortical system also occurs, lasting for much longer and capable of promoting a rapid return to a response state, should it be required.

Bottling up Anger.

As seen, anger exists to protect the organism, but actually puts the body under a great deal of physiological stress. The extensive and well documented research into Type A personality and health risks, (e.g. Booth-Kewley & Friedman 1987, Matthews 1988), although not equivocal, certainly points towards the hypothesis that anger and hostility place an individual at substantially greater health risks, especially from coronary disease. Barefoot et al (1983), for example found that doctors rated as

suffering from high levels of hostility were five times more likely to have died by the age of 50 than the low hostility group. Why might hostility and anger increase risks? As Rosenthal (2002) writes: "[anger causes the release of] *more epinephrine and raises the blood pressure. But when platelets attempt to repair the damage, plaque forms because the platelets are extra sticky due to the high levels of epinephrine. Foamy cells full of cholesterol are then attracted to the plaque, which grows, progressively blocking the flow of blood and depriving the heart (and other organs) of oxygen, without which tissue dies"* p218.

Dealing with anger

It seems that people are unsure of how to deal with anger. Diane Tice (1990), (cited by Tice & Baumeister 1997) for example, has found that people have fewer and less successful ways to manage anger than say sadness (see Thayer, Newman & McLain 1994 for depression reduction strategies), despite the fact that a failure to reduce anger is hugely detrimental. Two potential techniques for dealing with anger are suppression (ignoring the emotion) and reflection (where individuals discuss the problem with a cool head some time later). Harburg, Blakelock & Roeper (1978) found that the venting of anger produced much higher blood pressure levels than either of these techniques. On the surface it might seem strange that evolution has made anger an important adaptation to prevent organisms being taken advantage of, and yet anger is toxic enough to be associated with substantially increased health risks. It seems likely that this is some sort of limiting system, ensuring that an organism only responds to significant provocations. If people got excessively angry over the smallest issues, anger would lose its value. This also lends support to Zillmann's cumulative provocation hypothesis, an offence may be passed over in the first instance, perhaps it is too minor or perhaps circumstances dictate that an outburst is socially unacceptable, but at a later time in combination with other grievances, a trigger point may be breached and a 'global' response made. Evidence also suggests that anger is self-fulfilling, in the same way that the depressed person, focuses upon negative events around them, the angry individual attends to the roots of his anger which perpetuates the mood state.

Tice & Baumeister (1993) provide a useful overview of anger control techniques, some of which are summarised here. A first strategy is that of relaxing the individual through controlled breathing, rest, or other suitably calming activities in order to reduce physiological arousal. Likewise, social withdrawal

and isolation, encourages physiological calming as the presence of others is arousing, and it removes the individual from the arena of conflict, preventing further interactions that exacerbate the situation. Tice & Baumeister refer to 'cognitive manipulations' to diminish arousal, which include distraction tasks such as watching television or reading books. Cognitive manipulation disrupts the mind from dwelling upon the source of the problem and in doing so lowers arousal. The most effective cognitive tasks involve generating positive feeling, which is why people turn to amusing films/programmes to calm down. It would seem that either humour is incompatible with anger or inhibits it. Of course, care need be taken to ensure that the content of these sources does not give energy and fresh impetus to the anger state.

Another technique people commonly employ is to share any burdens with friends and confidantes and is probably effective because of the distracting qualities it promotes. On other occasions, an attempt to understand why another party is angry is a worthwhile tactic. Rational analysis can generate an awareness of the adversary's viewpoint, and insight into their motives. An event can be reframed and individuals choose not to respond to provocation or confrontations.

Pounding a punchbag could be considered a successful strategy because it isolates the individual and distracts him from the issue at hand, in turn arousal will diminish as tiredness increases. But some contrary evidence suggests that exercise can exacerbate situations by increasing arousal levels. Bushman et al (1999) found that subjects who were told punching was cathartic were more aggressive *after* punching the target. In addition, focussing on the cause whilst punching the punchbag could cause a misattribution whereby the arousal from exercise links to the thoughts of anger. (Zillman & Bryant 1974)

People also tend to brood over grievances to mood states, either because they cannot help themselves or to deliberately foster resentment. Prolonging anger requires sustaining strategies. Grievance rehearsal can either be maintained individually, or spread through other members of a social group who perpetuate the conflict. Another method is to endorse behaviour through self-justification, reasons are found to validate the active mood, usually involving the polarisation of the conflict into right and wrong, the more severe the offence, the more severe the response.

A summary of this research provides clues as to how anger might be induced in the laboratory. Firstly anger is often triggered by blocked goals, threats to self-esteem or unjust treatment. Anger builds upon anger, such that the retrieval of past experiences can activate sizeable emotional responses. This association principle allows for people to self generate emotion through sympathetic and empathetic cognition.

Mood Congruence.

Mood congruence provides some evidence of the link between emotion and cognition. Affective states have been shown to bias social judgements, social interactions and memory. In fact these memory effects operate in such a way that: *"memories that are stored, or encoded, when someone is in a certain state, such as depression, are most easily retrieved during that same state"* (Reus et al 1979). Furthermore, emotional states will bias cognitive processing - mood compatible cues in the environment tend to be noticed, and dwelt upon, more than if you were in an alternative mood. (E.g. anxious individuals attend to threat cues than non-anxious people, Mathews & McLeod, 1986). This process is considered to be subconscious. Mood states can sustain themselves for long periods of time, a depressed person thinking about the events integral to the depression, just perpetuates the unhappiness. This is why long term dysfunctional states can be difficult to overcome. In the opposite direction, cognitions have been found to shape state-emotion, a cognitive calculation (e.g. accepting responsibility for a mistake) for example might generate associated feelings of embarrassment and anxiety. Thus the two systems exist in co-operation such that: *"If emotions constitute the organism's ultimate evaluative system, cognitive activity can be viewed as transforming ambiguous information until the organism knows what value to assign it and what to do with it."* Klinger (1997) p349

Mood induction in the lab.

In terms of strict definition 'emotion' is considered a high intensity and short lived state whilst 'mood' is generally considered to be a low intensity but longer live. Unfortunately the psychological literature of emotional induction flits between both terms, when discussing state-affect. As such, this thesis will interchange between terms such that mood, emotion and affect all refer to state-emotion.

A variety of laboratory based mood induction procedures (MIPs) have been developed through the years. Several of the methods will be addressed in depth, in the relevant chapters of this thesis. However to acquaint the reader with the diversity of methods, a brief summary follows.

The Velten. Historically, the most popularly used method, the Velten or VMIP relies upon the subject to read a sequence of ordered self-referential statements and to try and feel the emotion they convey, an example being: *"This is great – I really do feel good – I am elated about things."* It is considered a cognitive mood induction procedure, meaning the subject has to 'think' himself into the desired state.

The Film/Story MIP. Results suggest this induction procedure is amongst the most effective, a film clip, written narrative, or audibly presented story is presented to the subject who is instructed to try and enter the feeling conveyed. Williams (1980), for example, utilised an audio narrative that detailed the story of an individual becoming ill with incurable cancer. Subjects were asked to imagine that the victim was a friend of theirs, thus invoking sadness. Similarly Clive Robins (1988) successfully shifted mood states by having subjects listen to audio narratives that detailed social rejections. Participants were asked to imagine being the main character. Alternatively Isen & Gorgoglione (1983) showed 2 films in association with a Velten procedure, one showing a man running then falling into his own grave to induce fear, the other a comedy piece designed to instil elation.

Musical MIP. Musical mood induction procedures have participants listen to pre-selected, mood congruent music pieces, and have been used primarily to invoke elated and depressed mental states. When the MMIP is given without explicit instructions to enter a mood state, it is considered a sensory procedure, in that the subject naturally enters the desired state and does not have to employ conscious effort to shift mood.

Feedback. The use of false feedback has been a less regularly used methodology. Subjects are characteristically deceived into believing they have done very well or very badly in a task or test. Experimenter interchange can then be used to heighten or diminish effects. In a slight twist, Wierzbicki et al (1994) successfully induced depression in subjects who became frustrated with an unsolveable problem.

Gift. A gift may either be unexpectedly given to induce elation, or a promised gift/reward can be withheld to generate negative affect. Isen, Daubman & Nowicki (1987) gave their subjects an unexpected gift of confectionery, leading to heightened positive mood.

Social Interaction (i). Here the subject is engaged by a confederate who seems to be in a particularly strong mood state (commonly unhappiness), the interaction is intended to invoke that same mood state in the subject. Alternatively, experiments have used physical interactions such as jostling to generate anger e.g. Stemmler (1989), Ax (1953), whilst Adsett, Schottstaedt & Wolf (1962) instigated stressful interviews in male subjects to measure cardiopulmonary changes.

Social Interaction (ii) – Insult. A study by William Gentry (1970) saw subjects insulted about their lack of co-operation and maturity during an experiment. Gentry found that under this 'insult' condition, subjects reported substantial increases in anger, accompanied by a significant rise in diastolic and systolic blood pressure, which are symptomatic of a noradrenaline reaction. He also found that men responded to a greater extent than women. Cohen, Nisbett, Bowdle & Schwarz (1996) had confederates direct offensive language towards subjects 'waiting' to take part in an experiment, in an effort examine regional differences of response in the United States.

Facial Expression, This procedure centres around having participants generate an expression such as a 'happy face', with the belief that the physical act induces real emotion. James Laird in 1974, got 77 subjects to smile and frown. Smiling subjects reported greater levels of happiness, whilst frowning engendered negative affect.

Hypnosis. As the title suggests, this induction uses hypnotic techniques to generate specified affective states. Bower (1981) selected highly conducive subjects, hypnotised them then asked them to remember elating or depressing episodes; Bower argues that the hypnosis technique enables a far easier control of state intensity.

Drug induced. Typically used for positive and negative mood inductions. In a double blind experiment, Kumari et al 1998, used Haloperidol (a dopamine receptor antagonist) and a placebo, presented via orally administered capsules to 40 subjects. Those who took Haloperidol recalled significantly fewer happy memories than the placebo condition. However, some caution is required before generalising the results. For ethical purposes, Kumari had to advise subjects that one of the conditions *was* Haloperidol and that it was dysphoric; following this a majority of subjects were reported as correctly guessing which condition they had been assigned to – which may have resulted in demand effects and confound.

Imagination. Participants are asked to internally generate examples of situations/occasions that will produce suitable affect such as happiness or sadness, anxiety or fear. When subjects are required to recall genuine life events, the procedure is known as 'autobiographical recall' (e.g. Baker & Gutterfreund 1993). It has proven a popular method through the years and Brewer, Doughtie & Lubin (1980) postulated that for a sample population of both sexes, it was superior to the Velten.

Environment. Some researchers have relied upon environmental factors to generate mood states, Gatchel et al (1975), sought to examine mood correlates and learned helplessness, this was successfully achieved by exposing individuals to an inescapable 95 decibel tone. Schwarz & Clore (1983) interviewed subjects on rainy and sunny days and found that the weather correlated with reports of life satisfaction.

There have also been a variety of experiments that have benefited from a combination of methodologies, such that Aderman (1972) who used a Velten induction and a tape-recorded narrative (adopted from Aderman & Berkowitz's 1970 study) Mathews and Bradley (1983) meanwhile combined the VMIP (using Teasdale & Taylor's 1981 statements) alongside a musical induction.

There exist some operational issues with MIPs that need to be considered. Firstly inferences derived from MIP experiments need to be tempered as "*We should be aware that our investigations of 'an emotion' are most probably investigations of several simultaneous emotions". Polivy (1981)* p816.
Secondly, explicit instructions raise questions of demand. These demand effects may prove larger with self report measures than for behavioural measures as they are easier to report falsely. Conversely, it

may be that self report measures if honest more closely match affect than other means. Thirdly, some methodologies may prove more effective with selected populations.

Measuring mood shift

Aside from physiological measures of mood shift which are not employed very often, two other methods predominate. As Velten (1968) first demonstrated, certain behavioural measures, (e.g. reading speed) seem to correlate with mood states, and their level can be used to determine the degree of mood change. Secondly, measurement can also be taken through self-report measures. The Visual Analogue Scale is one of the most popular and normally takes the form of a bipolar line marked from low to high in whatever variable is being measured. The VAS benefits from fast completion times and from the fact that subjects are quite capable of accurately gauging their moods. Alternatively mood adjective checklists such as the MAACL - Multiple Affect Adjective Check List, (Zuckerman & Lubin, 1965, and revised in 1986), PANAS - Positive Affect-Negative Affect Schedule (Watson et al., 1988) and POMS - Profile of Moods States (McNair et al., 1971) have all enjoyed use in mood research. For specific emotional states, specialised checklists such as the DACL - Depression Adjective Check List (Lubin 1965) have been employed. These checklists enjoy good validity and reliability but suffer from slower completion speeds, the MAACL for example can take up to 5 minutes whilst Spielberger's (1988) STAXI - State-Trait Anger Expression Inventory, a highly effective 44 item questionnaire takes around 15 minutes to complete.

Onwards

This introduction has shown several things. Firstly emotion seems to have a role to play in psi production, secondly laboratory based mood inductions have been shown to be successful in manipulating subjects' mental states, and thirdly parapsychological studies have tended to use either post hoc or factor analysis in examining mood states, and not sought to govern affect directly. Thus, there exists good reason to do exactly that, and create a programme of research that looks into the interaction between mood, consciousness and PK both under experimental conditions, and more naturalistic ones.

To gauge psychokinesis, all the experiments in this thesis utilised the measuring system of an Orion RNG coupled to, and sampled by, an Evesham Laptop Computer. Processing was carried out by a 600MHz Intel Celeron processor, and the RNG was sampled via the serial port, at a rate approximating 200 bits/sec. Much of the published literature refers to a 200 bit sample as a *trial*. I consider this confusing as psychological reports sometimes refer to a trial as an experimental period. Therefore, this thesis shall refer to each independent 200 bit sample as a *cycle*.

The Orion RNG is assembled in Holland for educational and commercial customers and is one of the RNG types used in the Global Consciousness Project (GCP, 2003). Randomness is derived through electron tunnelling across a pair of Zener diodes, whose outputs are passed through a NAND logic gate. This logic gate ensures that should both diode outputs exceed threshold values, no overall output is recorded – thus minimising first order bias. By sampling the RNG at a regular rate (e.g. 200 times per second) a binary data stream of ones and zeros is produced, and the device can thus be considered analogous to a highly sophisticated coin-tosser. Before the manufacturers ship any Orion RNG, they are tested for bias, and all data from these samples are supplied with the appliance. As the manufacturers explain: *"Each RNG passes a 256 run randomness test before being shipped. Each run consists of 8192 8-bit samples... If the first order bias is larger than 1 bit in 2000 bits the RNG will be rejected."* (Orion, 2003)

Every 200 bits, the computer calculated and outputted to a data file how many ones and zeros the RNG produced during that cycle, such that 107 (ones) and 93 (zeros) would be logged as +7, whilst 96 (ones) and 104 (zeros) would be logged as –4. These values could then be cumulatively summed, moment to moment, to gauge the behaviour of the measuring system. Mean chance expectancy would be an equal number of ones and zeros per cycle, with a variance of 50.

Let me pause here to reiterate that from a non-psi perspective RNGs are not open to influence. Great care has been taken, during their manufacture and operation, to make sure that they hold no inherent bias, and that environmental factors do not impact (to any significant degree) upon functioning. So

called 'acute' testing has been examined previously and as researchers at Princeton have reported: *"the effect of temperature changes near the noise source is found to be negligible within the normal operating range... Similarly, no effect has been found, even in plus only or minus only counting modes, of ambient electromagnetic fields or of static magnetic fields."* (Nelson, Bradish & Dobyns 1989, technical note, p7). Despite the apparent all-clear for electromagnetic effects, further effort can be undertaken to minimise any potential influence. For example, although the Orion is electromagnetically shielded, all testing for this thesis saw the RNG separated from the computer by a 1 metre cable, to minimise any possible radiation given off by the computer (i.e. monitor display).

For RNGs to be of any use to the experimenter, one must expect truly random data streams and generalised randomness testing bears out that under control (no subject) conditions, RNGs behave in a properly unpredictable fashion, and yet under experimental protocols, outputs (across laboratories, and across experimenters) seem to take on order. Radin & Nelson's (1989, 2002) previously discussed meta-analyses suggest that the pattern witnessed by experimenters is unlikely to be due to chance. Evidence from volitional studies, as well as proximally placed field measurements suggests that anomaly is, to some extent, a function of the consciousnesses of individuals 'involved' with the system.

The RNG used for the experiments in this thesis, has undergone regular and extensive randomness testing. Control periods have been carried out in isolated environments, where the experimenter alone knew that test trials were in operation. Trials were performed under fixed period protocols (e.g. 10-15 minute samples), chosen to approximate the run lengths found under experimental conditions. The control data can thus be considered analogous to a large collection of comparable length, no-subject trials. It should be made clear that the no-subject trials were not matched (one to one) with experimental trials, rather they were accumulated over the lifespan of the research producing relatively greater numbers of episodes than a matched protocol approach. Although it is nigh on impossible to completely rule out unwanted or unintentional psi effects influencing the system, the safeguards used can be considered satisfactorily tight. The no subject condition showed no inherent bias, averaging 100.0037 bits per cycle (where 100 is predicted by chance) over a total dataset of 87,292 cycles (17,458,400 bits), with a standard deviation of 7.0426. A single group t-test revealed $t = 0.155$, $df =$

87,291, p=0.88 (two tailed). All no subject conditions had a randomised lag period built into the sampling to enable the experimenter to vacate the testing environment before data collection began.

Chart 2.1 - Cumulative deviation for no subject trials

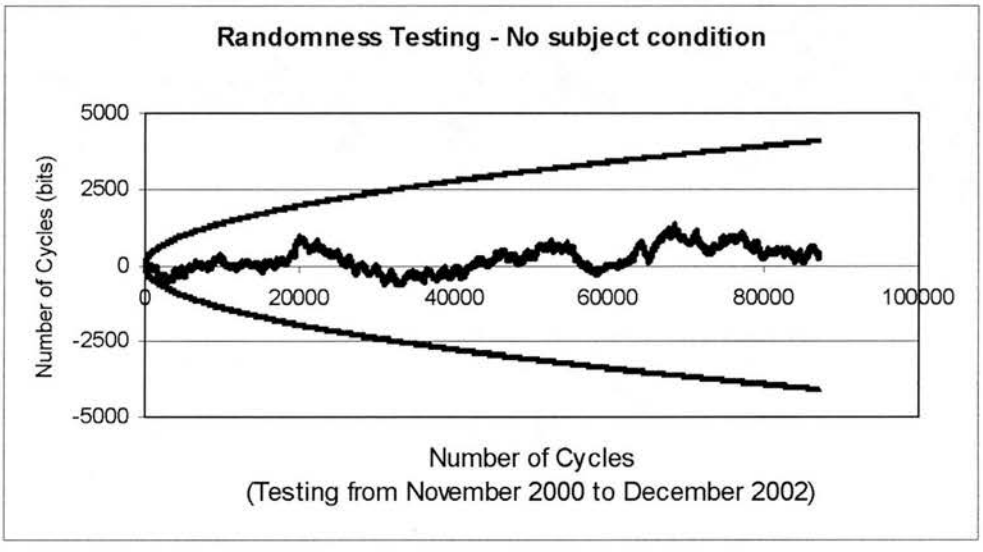
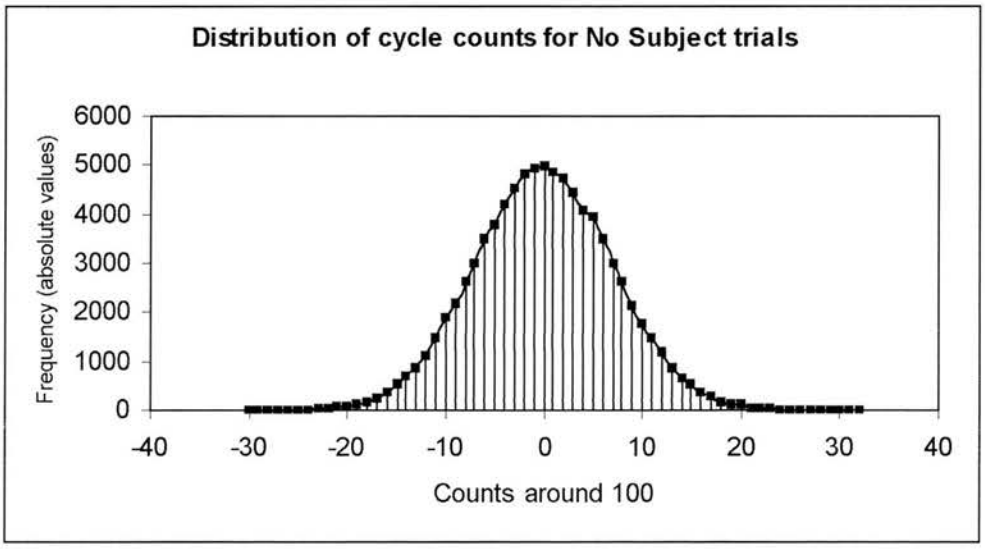


Chart 2.1 shows the cumulative output of the RNG during control tests. Note that the middle line corresponds to the 'random walk' of the RNG, whilst the upper and lower parabola are the 0.05 levels of significance (two tailed). Chance expectancy would predict a Gausian distribution of deviations around a centre point (where there is an equal number of ones and zeros). Chart 2.2 (below) represents the distribution around this point for all cycles in the no subject test conditions.

Chart 2.2 - Distribution of Cycle Counts, no subject conditions



The formal experiments in this thesis typically do not have no-subject conditions, rather results are compared against mean chance expectancy. Watkins, Watkins & Wells (1973) carried out an experiment where subjects tried to speed up the resuscitation of anaesthetised mice. It was found that mice recovered significantly faster if placed into a container that had been *previously* attended to by PK agents. This phenomenon was termed a 'lingering effect', and the suggestion was that psi interactions might be directed towards certain points of time and space, effecting any measuring system placed therein. As such, it was felt that running control periods directly after an experimental trial could be liable to lingering confounds. In addition, trials were not run before a formal trial, for two reasons. Firstly, as a matter of convenience, it was not always possible to run lengthy trials in the field. Secondly unintentional experimenter effects just prior to a trial (e.g. expectation, heightened arousal could impact upon the control trials; maybe the experimenter wanted a particular output?) which could then linger, confounding the data that immediately followed.

The reader should be aware of the potential problem of short-run bias in RNG testing. Binary event outcomes are predicted to culminate, over a large dataset, in a binomial distribution. Problems can arise, however, when the sample size for the dataset is too small; for example a 10 bit run may culminate in an outcome of 8-ones and 2-zeros. The benefit of using relatively high speed event generators such as the Orion RNG is that they can be programmed to sample at multi-bit per second speeds, rapidly diminishing short run problems. If one considers a 200 bit/second sample rate, even short time periods (e.g. 1 minute) result in a large number of bits being generated (i.e. 12,000). Conversely a 2 second sample only provides 400 bits of data and provides a far greater opportunity for skewed results. The reader will note throughout this thesis that the problem of short run bias is overcome through the relatively lengthy experimental conditions. In the very few cases where short runs may occur, the issue will be highlighted at the appropriate point.

During an experiment, the measuring system (herein simply referred to as the RNG) was typically used in one of two ways. Under a covert protocol, the RNG would be activated by the experimenter and stopped either by the experimenter or the subject under instruction, subjects would not be informed as to the nature of the RNG setup, and the Orion hardware was hidden out of view. Under an overt or

normal protocol, subjects were aware of the RNG's purpose, and it was placed proximally to the subject.

Data is presented to the reader as terminal stouffer z values, which are normalised z scores. The terminal deviation is divided by the standard deviation and the square-root of the number of trials. e.g. +300 bits, over 900 cycles with a standard deviation of 7.05 becomes $(300 / 7.05 / \sqrt{900}) = 1.42$. This stouffer z can then be converted to a p value where .05 significance is broached at 1.645 (one tailed) and 1.96 (two tailed).

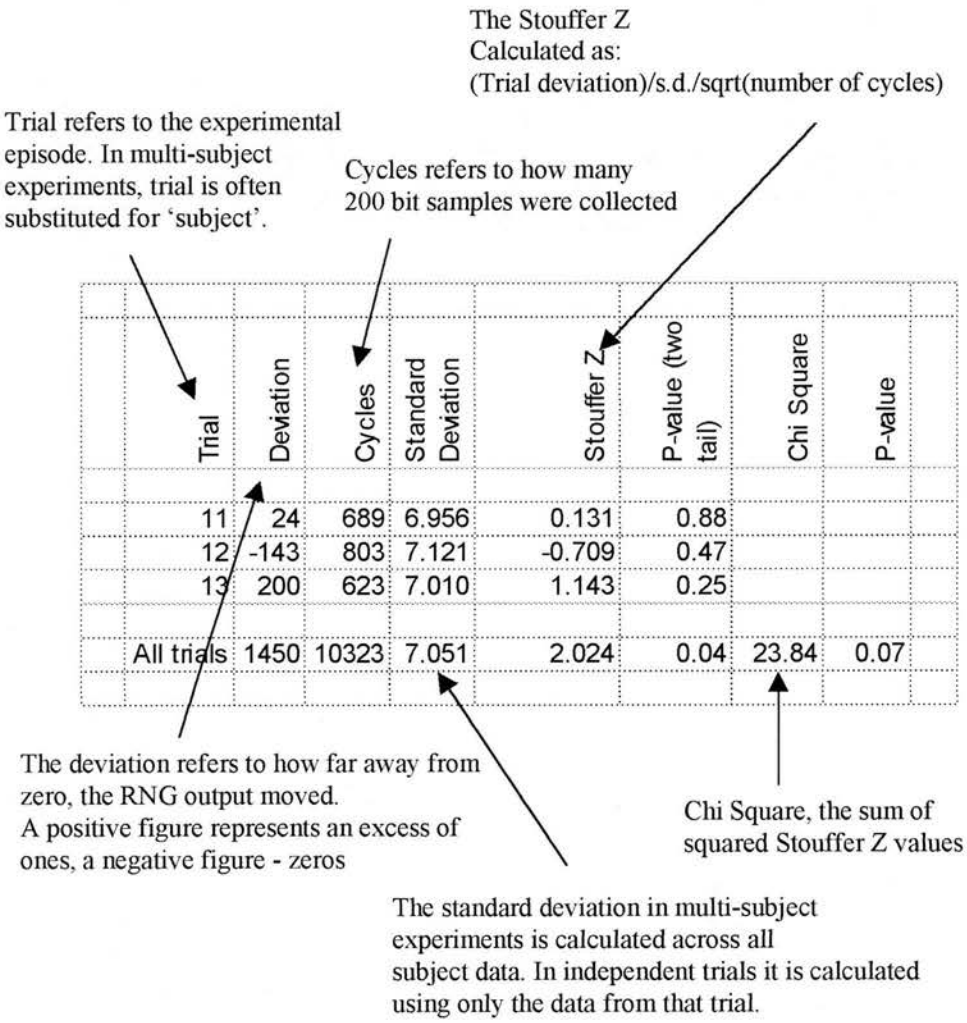
Effect Size Calculations

All effect sizes derived from data in this thesis are calculated using the conventional $[Z/(\sqrt{N})]$ formula. This produces a cycle based effect size which has historically been the preferred method of calculation in RNG studies.

Standard Deviations

The decision to use the trial standard deviation instead of the theoretical standard deviation stemmed from the view that each RNG output is fundamentally unique and that the SZ value should be geared to incorporate as many trial-relevant components, from an episode, as possible. Jettisoning experimentally derived data in favour of theoretical values could be construed as a less sensitive measure of any effect. By having a variable SD value, trials with lesser variance end up generating a marginally greater Stouffer Z than those with higher variance. E.G. +400 bits over 900 trials would culminate in an SZ of 1.93 were the standard deviation 6.8, versus an SZ of 1.88 using the theoretical SD of 7.071. In reality the experimental standard deviations occupy a small range both below *and* above the theoretical figure and from an empirical perspective do not impact to any great extent on the overall outcomes. Nonetheless the trial-based protocol at least allows for possible variance anomalies to become incorporated into experimental calculations. The validity of using of trial based standard deviations was confirmed in a private communication with Roger Nelson. Alongside Stouffer Zs, chi square values have been calculated to provide indications as to the variance of any particular dataset. Figure 2.1 (beneath) provides the reader with a guide to results tables.

Figure 2.1 - Guide to Results tables



As figure 2.1 illustrates, standard deviation values are calculated on a trial to trial basis.

The randomness testing contained within this chapter provides a high degree of comfort to the author that the RNG behaves according to chance expectancy, under no subject conditions. With the integrity of the system suitably endorsed, one can proceed to examine how the RNG's output varies under experimental conditions.

Chapter 3 – Animal Rights Experiment

Having examined the literature, there is reasonable cause to suggest that pent-up emotional states could serve to underpin PK functioning. Furthermore, the variety of mood induction methods available to the researcher should enable facilitative and replicable protocols to be established. An individual holding a mental state such as anger, may seek reduction both through conventional channels (e.g. physical release, distraction, projection etc.) and through less conventional psi channels, especially when normal release mechanisms are blocked (as per RSPK theory). As such, this experiment sought to induce affective change, generating anger and subsequent elation, to examine how these states passively impacted upon the functioning of an RNG.

The laboratory-based induction of negative moods such as fear or anger is fraught with both ethical and practical issues. Firstly there is the very real concern, especially when invoking negative mood states, that powerful stimuli may unlock repressed memories in the subject. For example, an experimenter may seek to induce anxiety in a subject by presenting stimuli detailing unpleasant criminal acts. Unbeknownst to the researcher, and despite the unlikelihood, the subject may have recently been involved with such an incident, and this re-encounter may provoke a level of trauma that experimental psychologists are not equipped to deal with. Secondly, the induction of affect has been shown to facilitate increases in bodily arousal, such as blood pressure and heart-rate. Procedures that seek to produce an energetic mood state such as fear may produce unforeseen stresses, which place the subject in danger. Although the chances of experiments proving *dangerously* effective are undoubtedly slim, experimenters must give consideration to their potential reality, consider whether background checks should be carried out and whether informed consent should be sought. From another perspective, the use of 'insult' methods, detrimental feedback on task performance, and physical contact (manhandling) are viewed by some, as ethically unsuitable for anger induction. Equally they are impractical for psi research, as there would have to be real-time interactions between the subject and the experimenter during mood generation, potentially confounding any RNG system. Thus for this experiment, the autobiographical recall method was chosen; as it could be used to generate the (relatively hard to invoke) state of anger, it could be administered to a solo subject and because of the 'personal' nature of the stimuli - subjects could attend to individually relevant memories.

The Autobiographical MIP

As touched upon in the introduction, the Autobiographical MIP, belongs to the 'imagination class' of induction procedures, where subjects ideate a personal episode to generate state mood shift. It works by asking participants to recall a personal episode associated with a specified mood (e.g. *"recall and re-experience something that made you truly fearful")*, an upshot of which is the re-experiencing of the emotion at the time the memory was codified. The autobiographical method has been particularly popular for the induction of sadness and happiness, and has also been used for mood inductions with children (e.g. Masters, Barden & Ford, 1979. Bartlett, Burleson & Santrock, 1982.), where developmental issues might preclude more sophisticated techniques. In 1981, for example, Barden, Garber, Duncan & Masters, tested 140 four-to-five year old children to examine primarily how self-gratification and altruistic behaviour varied with mood. Using the autobiographical method to produce the states of happiness, sadness and neutrality, mood shift was measured by independently observed facial expressions on the respondents and self reports. With the self reports, children were asked to choose which of three archetypal faces (smiley, sad and no expression) most closely matched their mood – before, during and after testing. The researchers found that negative moods correlated with a decrease in altruism and an increase in self gratification.

Under the AMIP, once subjects have chosen and retrieved a particular experience, it is either vocalised to the experimenter, or written down (which can help to concentrate the mind) or in some cases the experience is allowed to remain internalised. The obvious benefit of such a technique is that personal episodes tend to be more salient than generalised stimuli, as different things move different people in different ways. There is always the fear that a pre-packaged experimental stimulus might generate happiness in one person and anger or anxiety in another.

The oft-cited Beck (1967) noticed that clinically depressed patients tended to focus upon negative personal memories, and the effect can be generalised for non-clinical populations: when in a happy mood the tendency is to recall an episode in a positive manner, the same episode is recalled more negatively when state mood is negative. This 'mood congruent recall', according to Bower (1981), is most likely a product of the *fire together, wire together* axiom, whereby a perceptual experience is a

product of its neuronal underpinnings, and a re-firing of specific parts in the network will prime any associations. Imagine, for example an event that made you especially happy. The perceptual components of this episode were codified into your memory under a specific emotional state, when cognition chooses to re-examine the event, the neuronal state is rekindled and the emotion at the time the memory was laid down is re-experienced. In this example of happiness your body's physiology may also exhibit changes including the release of neurochemicals (such as dopamine) and a lowering in blood pressure. Alternatively an incident that made you furious will, upon purposeful recollection induce an increase in heart-rate, adrenal levels and blood pressure. Research from Parrott & Sabini (1990) revealed that when subjects were asked to think of personal episodes that made them unhappy, 61% of respondents chose past life experiences, whilst 15% chose current ones.

Thus under experimental conditions, invoking mood change in a subject should be a question of unearthing salient personal episodes and getting subjects to suitably re-experience them. However, some other factors need to be considered. Under circumstances where the subject is required to recount the episode to the experimenter directly, various experiences might prove too painful or embarrassing to retell, and are thus avoided. It is exactly these episodes that are most useful to the experimenter because they hold the highest emotional intensity. Despite an undertaking to provide confidentiality, subjects may still not be forthcoming, and researchers need to consider carefully whether there is a necessity for the memory to be overtly expressed, or whether internalisation is sufficient. Alternatively, embarrassment might bias recall, and by presenting to the researcher a 'sanitised' version, the subject moves away from the original event, and the associated emotion becomes weaker.

Brewer, Doughtie & Lubin (1980) were the first researchers to use the autobiographical MIP experimentally, having noted how Mosak & Dreikurs (1973) had used patients' recall of past memories in the clinical setting to induce affective change. In their 1980 study, Brewer et al instructed their subjects via a pre-recorded audio-tape to close their eyes and think of three personal experiences that would inspire either depression or elation. Meanwhile participants in the control condition read a non-emotive article. Mood shifts were measured on the DACL, Beck Depression Inventory, and the State-Trait Anxiety Inventory, which confirmed that autobiographical recall induced significant change in target emotional states. At the time, the Velten procedure was far and away the most popular method of

inducing mood change in the laboratory, and Brewer et al were interested in comparing the two methodologies. Under their Velten protocol subjects read self-referential statements every eight seconds, (displayed by projector onto a screen), having been instructed to do their utmost to 'feel' the states conveyed. Whilst the Velten also proved successful in shifting mood, comparisons led Brewer, Doughtie & Lubin to conclude: *"Results supported conclusively that Autobiographical Recollections was the superior method* [to the Velten] *for inducing not only depression, but also elation in a population that included both sexes* [there is a female bias with the Velten]" p223. This enthusiasm was borne out by a 1994 review of mood induction procedures by Gerrards-Hesse, Spies and Hesse, wherein the authors grouped the results from manipulation checks in original experiments to produce an overall effectiveness for each MIP. They calculated that the 'imagination' procedure as a whole (where mood states are internally generated) was effective in seven out of eleven elation studies, in ten out of ten depression studies and in fifteen out of sixteen intergroup (elation vs. depression) studies, thus providing an overall effectiveness percentage of 86%, some 4% better than the Velten. Such a figure, ranked the autobiographical method as an averagely successful procedure, a conclusion that was also reached in a review by Westermann et al (1996), although Westermann found that Velten protocols were equally effective.

Another piece of research to utilise personal recall was that of Schwarz & Clore (1983). In part of their study, they asked 61 subjects to produce verbal reports of recent life events that generated elation or depression, they found that mood state positively correlated with evaluations of life satisfaction in general. Lantermann & Otto (1996) likewise, tested 194 undergraduates to examine how mood correlated with future expectations, and also found that people in good moods were more positive about their futures, whilst depressed individuals were markedly more pessimistic. Meanwhile Gilboa & Gotlib (1997), used the autobiographical method to evaluate cognitive interference. One of the findings, which tallies with depression research, is that subjects who had previously suffered dysphoria remained in their negative mood states for longer than subjects who had never experienced dysphoria.

A common feature of laboratory inductions is the combination of one or more induction methodologies into an amalgamated procedure. Kulbartz-Klatt, Florin & Pook (1999), for example, combined personal recall with the Musical MIP to investigate how body width estimation in bulimia sufferers was

dependent upon mood. Over a 15 minute induction, 100 female subjects recalled two life experiences that made them very sad or very happy. Subjects in the depressed condition then listened to *Liszt's - Via Crucis* whilst those in the happy condition listened to *Mozart's - concerto for violin and orchestra, number five*. The induction of affective change was successful, and Kulbartz-Klatt reported that depressed bulimia sufferers inflated their estimation of body widths, whilst elated subjects did the opposite. It is argued that these combinatorial approaches provide richer perceptual experiences, thus minimising the chances of an experiment failing to engage the participant. In a similar vein, Mayer, Gayle, Mechan & Haarman (1990) applied a combination of mood congruent stories and music, whilst Mueller & Donnerstein (1981) combined social interaction (through a confederate) and the Film MIP.

Autobiographical recall was utilised in a neurological study by Damasio et al (2000). Damasio is author and advocate of 'somatic marker theory' (see Damasio 1994) which stipulates that emotions are sensations that highlight any particular episode, through innate and culturally learned preferences. Using a Positron Emission Tomography scanner, 41 normal subjects were asked to recall and re-experience 4 self generated emotional episodes (sadness, happiness, anger and fear). The write-up can be summarised by Damasio et al's assertion that: *'Overall, activation and deactivation patterns varied qualitatively among emotions" p1050,* thus lending considerable support to hard-wired theories of emotional generation. Anger states produced notable patterns such that skin conductance was raised (mean of 2.61 versus control of 0.63), heart rate increased (mean of 79.65 beats per minute versus control 74.25) and intensity ratings soared (mean of 3.09 versus control 0.38, scale 0-4). In turn, certain parts of the brain showed *emotion specific* activation although these were not always unique. The table 3.1 (below) is adapted from Damasio's results and picks out some of the main neurophysiological findings.

Table 3.1 – Regions of brain activity for anger

Active regions for anger: Dorsal pons, anterior pons, dorsal midbrain, hypothalamus, insula (bilateral), anterior cingulate cortex, both sides of mid-line cerebellum, right lateral cerebellum, lenticular nucleus, left thalamus, motor cortex (bilateral)
Negative peaks: secondary somatosensory cortex (SII), orbitofrontal region.
Major negativities: in neo-cortical areas of both hemispheres: right frontal pole, right dorsolateral prefrontal cortex, inferior parietal lobule (bilateral), left parieto-occipital region, inferotemporal & temporal polar regions, occipital (bilateral)

"These results support the idea that part of the feeling state of emotions might be grounded in emotion-specific neural patterns in the regions identified here. Those neural patterns are different for each emotion... [and] *brainstem activation changed with each emotion condition. This suggests that the changes may be related to the particular physiological program of each emotion, specifically the engagement of some program sub-components during the processing of an emotion."* (p1051, Damasio et al 2000). Interestingly, Damasio failed to find significant activation in the amygdala, a region that was widely believed to have been associated with anger. Damasio attributes this lack of effect to the autobiographical procedure, as the amygdala is known to be most active when the visual system is engaged, the use of internally recalled episodes thus precludes the same level of activation. Therefore, the amygdala may well be involved in emotional generation but only where there are active visual components. Individual differences in physiology may go some way towards explaining individual differences in emotional perceptions, and linked faculties such as cognition (and possibly psi).

As this thesis will go on to show, the big problem with affect inductions has always been and will probably continue to be, demand effects. When a subject reports that they are very happy, are they telling the truth? Furthermore, do explicit instructions to enter target states put additional pressure on participants to the degree that they choose to misrepresent their true feelings? Of course, it is none too hard for individuals undergoing mood inductions to second guess the purpose of the stimulus, but there is a suggestion that the imagination protocol holds less demand effects than other methods because subjects are simply asked to recall a pertinent episode, not asked to actively enter an affective state. Since instructions are less explicit, there is less compulsion for the subject to 'please' the experimenter.

In this chapter's experiment it was felt that an autobiographical induction by itself was not conducive for generating lengthy RNG outputs, which are required to overcome short-run bias. In addition a combined procedure might help generate even more pronounced affective changes. Thus in the tradition of combining induction procedures, the author turned towards a second means of mood shift – The Story MIP.

The Story MIP

The story MIP uses written or audibly presented narratives alongside three possible protocols. The first presents the story with explicit instructions; subjects are told to induce a specific mood state, and use the narrative as a catalyst. Under the second, subjects are directed to attend to the stimulus and simply try to empathise/sympathise with a principal protagonist; no specific mood is primed by the experimenter and it is hoped that the empathising process invokes the experimenter's target emotion. The third protocol simply directs the subject to read or listen to the stimulus, no instructions are delivered to the subject to use the stimulus in any particular way; it is inferred that this perceptual process will instinctively invoke mood shift. The stimuli themselves can be real-life excerpts or fictitious ones. In 1983, Johnson & Tversky looked at perceptions of risk, hypothesising that a heightened mood state, engendered by fear provoking incidents, would cause increased perceptions of risk. Newspaper style narratives were presented to subjects who initially read two 'filler' stories of 'brief and mundane items' followed by manipulation stories concerning fatalities from fire, crime and leukaemia. A link was established such that: *"The results of the studies... demonstrate that mood induced by brief reports has a large and pervasive impact on estimates of the frequency of risks and other undesirable events."* p29. Although fictitious articles such as those used by Johnson & Tversky can provide powerful feeling, there runs the risk (under protocol three especially) that the subject fails to seriously engage the stimulus as it is unrealistic or contrived; or that they simply do not know what to make of it. Thus the utilisation of credible real-life events could prove more salient to the participant, and negate the need for the experimenter to provide explicit instructions.

One example of a successful story MIP was carried out by Joe Forgas (1994), who sought to investigate whether people in sad moods blamed themselves for 'negative relationship events' whilst people in positive moods took credit for positive events. Forgas successfully initiated mood shift by presenting 3 short written passages that were humorous (positive condition), sad or neutral and instructed subjects to empathise with the characters. Results from the study confirmed the hypothesis.

Like autobiographical recall, the story MIP is believed to work by activating neural connections during the reading process which in turn activates linked nodes, priming behavioural and emotional responses. As the percipient reads the narrative, cognitive evaluations of the individuals and exploits therein

generate geared emotional responses through sympathetic or empathic processing. As mentioned previously - emotion, cognition and behaviour are inextricably linked to provide adaptive responses to stimuli. Shifts due to the story are simply a result of the mechanisms that enable people to respond swiftly and appropriately to everyday situations. The MIP reviews cited above, both show that the story MIP is a highly effective procedure. Gerrards-Hesse et al (1994) concluded that in the absence of specific instructions, it worked in 95% of studies, and that it did not suffer from the disparity between elation and depression conditions that was witnessed with the autobiographical method. Meanwhile the Westermann et al (1996) meta-analysis ranked this methodology as the third most effective; and went on to indicate that *the* most effective induction method of all was the story MIP *plus* explicit instructions (to enter a target mood state). Gerrards-Hesse et al concurred finding that story plus instructions was 100% effective in the thirteen studies they examined

The experimenter must remain aware that people may respond to a stimulus in very different ways, especially when using an unselected population – a written narrative detailing racial abuse and employed to induce anger may achieve the desired effect in one subject, but alternatively could arouse sympathy in another, and amusement in someone else. Clark (1983) has warned that self-reports are more liable to faking than alternative performance measures, therefore care must be taken by the researcher when evaluating conditions that may run foul of socially accepted norms. Moreover, there is some logic in tailoring and presenting a content-relevant stimulus to a selected population, whilst obviously keeping an eye on the generalisability of any effect. Typically mood manipulation studies have tended to avoid using selected populations, as affective change is not the dependent variable (it is the manipulation) and the experimental aims do not warrant targeting specific subject pools. However, should one wish to do so, there are a wide variety of special interest groups who share common beliefs and goals: environmentalists, political activists, anti-abortionists. A narrative that details an act corresponding to a group's ideals should produce positive mood shift, whilst a contrary 'conflicting' stimulus would be expected to generate negative mood shift. This mood shift could be augmented, if the subject were emotionally primed beforehand. The use of special populations should benefit from a reduction in wastage (unsuccessful inductions) and the idea that belief-specific stimuli provoke stronger than average mood changes.

Special populations have been employed in previous psi research. The ESP literature, for example, details research with practitioners of Yoga and meditation – e.g. Stanford (1984). Likewise, PK studies have also tested Yogic Practitioners (Winnett & Honorton, 1977), and Transcendental Meditators (Braud & Hartgrove 1976), to name but two. The fairly obvious reasoning behind using such groups was that individuals skilled at moderating their consciousness, might be able to boost any psi functioning they held. But surely one can derive a greater understanding of the nature of psychokinesis, and how it might operate on a day to day basis, by using an 'untrained' general population? With this experiment the aim was to avoid using subjects who might be considered (in some way) more prone to psychic functioning, rather to use a group of individuals who shared a common belief system and provide context specific material so that PK might be unconsciously generated. Whether results from groups with common belief systems can be considered universalisable is open to debate, but consideration should be given as to whether PK under such a circumstance is subject to such problems.

Method

Subjects and Recruitment

It was decided to use a test population containing individuals with an active interest in animal welfare; the selection criterion being that individuals had to hold current membership of an animal welfare organisation, and not just profess 'a concern' for animal rights. The organisation *"Advocates for Animals"* was approached and kindly agreed to assist in recruitment – and members within Southern Scotland were contacted via a pullout advert contained within the quarterly newsletter. To avoid pre-empting the parapsychological nature of the experiment, information was kept deliberately vague, and can be summarised from part of the text: "*....Researchers in the psychology department of the University of Edinburgh are looking to recruit people with an interest in animal welfare, to take part in an innovative experiment, examining how attitudes impact upon environments...*"

This newsletter reached around 800 individuals, of which 20 responded, indicating they would be interested in taking part. Ultimately seventeen subjects were tested and the experiment concluded after five months when recruitment dried up entirely. Five male and twelve female participants, ranging in age from early twenties to late sixties were tested. Data for subject 10 was not included in the analysis, as for some unknown reason, this participant chose to complete the workbook in her own idiosyncratic

order counteracting the graded emotional induction and making meaningful analysis of the RNG output - unworkable.

Due to the vague nature of the recruitment leaflet, and aware that participants might wrongly assume the experiment was primarily about animal welfare, potential subjects were contacted and advised that this experiment was not of any 'practical' benefit to animals or the animal welfare debate, but that it focussed on providing insight into human performance. In addition, subjects were given the opportunity to be tested at a venue of their choice instead of the laboratory, due to (some) substantial travel distances involved.

Location

Subjects who opted to travel to the psychology department were tested alone in a small second floor laboratory next to the author's office. Seven subjects declined to travel of which 5 were tested at their homes and 2 at their offices. The experimenter ensured that each participant was to remain undisturbed during testing. In all locations the experimenter left the test area prior to trial commencement to provide some physical and sensory distance. Upon trial completion, subjects were advised to leave the test area and locate the experimenter.

Pre-experiment briefing.

Subjects were verbally advised that they were to complete a workbook that would invite emotional change, and that further specific instructions were printed within the workbook. Subjects were informed that emotionally congruent personal episodes would be sought and that these were to remain wholly confidential. As such serious efforts should be made to accomplish the target states. A formal experimental manner was maintained to reiterate the earnest approach required of the subject.

The workbook

The author created a ten page workbook that encompassed mood stimuli presentation (anger and elation) and the self-report measuring scales of mood. The first induction stage, utilised an autobiographical MIP, and asked subjects to write about "*an act or incident that made you truly*

angry." As with each part of the workbook, subjects were not given time limits for completion, nor constraints on how much they could write.

Following this induction, a control section was inserted, which aimed to divert the subject from further emotional induction without diminishing any current level of arousal. Thus, subjects were asked to memorise a list of words (*Rage, Hunger, Thirst, Storm, Mood, Passion,* and *Ire)* which had been selected due to their emotional congruence.

After this control period, a story MIP *without* explicit instructions was employed. A photograph of a hedgehog was printed at the top of the page and subjects were asked to tick boxes that corresponded to the perceived characteristics of the animal (*vulnerable, cute, passive, harmless, funny, speedy, road-wise, likeable).* This priming was designed to force subjects into making concrete judgements as to a hedgehog's character; as it was believed that cognitive dissonance would then prevent any ad hoc re-evaluation, i.e. if a hedgehog is considered *'vulnerable'*, activation of this node might also activate concepts of defencelessness and fragility – an act against a defenceless animal is typically considered less legitimate than against one that can defend itself. If the animal were also considered cute or likeable, harmful acts against it would be considered more reprehensible.

With an eye to the ethics of mood induction, it was felt that using fictitious (and highly unpleasant) accounts of animal cruelty may be too evocative for some animal rights subjects and might produce excessive physiological stress. Therefore, it was decided that articles drawn from mainstream publications were more legitimate, as they detailed real occurrences, and that the actual texts themselves were available for public consumption.

The first narrative, was an article taken from the Birmingham Post newspaper (September 1999 – see appendix A) detailing a court case brought by the Royal Society for the Prevention of Cruelty to Animals against two men who drunkenly kicked a hedgehog to death. Eyewitness testimony recounted how the two individuals *"looked a bit like footballers tackling each other. I could see something at their feet. They were trying to kick something through some railings."* Having read the article, participants were asked to rate how they felt about the "act", and the "perpetrators". This was done by placing a score (1-mild. 2-moderate. 3-strong) against one possible heading: Anger, Pity, Admire,

Neutral. This scoring system was used instead of MACLs or DACLs for reasons of speed, the author did not want lengthy periods of RNG output confounded by form filling. As discussed above, an attack on a - *vulnerable, cute, harmless, likeable* animal would commonly be viewed more provocatively than against an animal that was unattractive, disliked and capable of defending itself, and should therefore elevate or at least maintain levels of anger.

The second part of the story MIP, used the same format as above. A photograph of a kitten was presented, followed by a list of characteristics that subjects were invited to select from - *restful, fun, innocent, cute, playful, vulnerable, loving.* Following this was printed an article, taken from The Daily Mail of January 2000 (see appendix B), headlined: *"Three months for Thug who put cat in the microwave"*. In this case, the RSPCA had once again brought a court action against a man who microwaved a four month-old tortoiseshell kitten, Tilly - for five minutes, resulting in *'horrific burns'* and ultimately, the amputation of a leg and tail. Having read the text, subjects were once again asked to rate how they felt about the act and the perpetrator. Both the Birmingham Post and Daily Mail articles were marginally edited for format and content.

When generating negative affect in the laboratory, there is an onus upon the experimenter to return the subject to a pre-manipulation state. After all, if a highly aroused subject were to leave the experiment and become involved in an accident or 'unfortunate' incident, the experimenter would have to bear a significant proportion of the consequences. To counteract these problems, the last section to the workbook, re-employed an autobiographical MIP, but this time invited subjects to recall and re-experience an act or incident that made them *"truly happy"*.

RNG

To measure any psi effects, an RNG measuring system using a 'covert' protocol, and measuring at the standard 200 bits/second, was positioned on the subject's workspace. The screen provided no feedback as to the state of the RNG (which subjects were unaware of), but in the top left hand corner was a count/sample number, increasing second to second. At the bottom of each workbook page was an empty box with 'sampling number' written above it. Subjects were instructed verbally and within the printed instructions to write, in each box, whatever sample number the computer displayed at that time.

This number would therefore synchronise passage through the workbook with RNG activity. Subjects were not told the purpose of the computer, and the ever-increasing sample number, pre-experiment.
The experimenter started the sampling process, and a short built-in lag period enabled him to vacate the test area before the RNG was sampled. Subjects were then responsible for stopping the system once they had completed the workbook.

Debriefing

After completing a trial, the subject located the experimenter and a standardised Powerpoint-based debriefing was carried out that explained: the rationale behind the experiment, the measuring system and the implications of positive results. This period of interaction importantly sought to clarify the effectiveness of the mood inductions, and to ensure that no negative affect lingered, and gave the subject a subsequent opportunity to withhold their data.

Hypothesis.

The anger induction periods of autobiographical recall (section 1) and selected narratives (section 3), would correspond to anomalistic RNG functioning, represented by a significant cumulative deviation across the subject pool. The direction of this anomaly (above or below mean chance expectancy) was not predicted.

Pilot Study

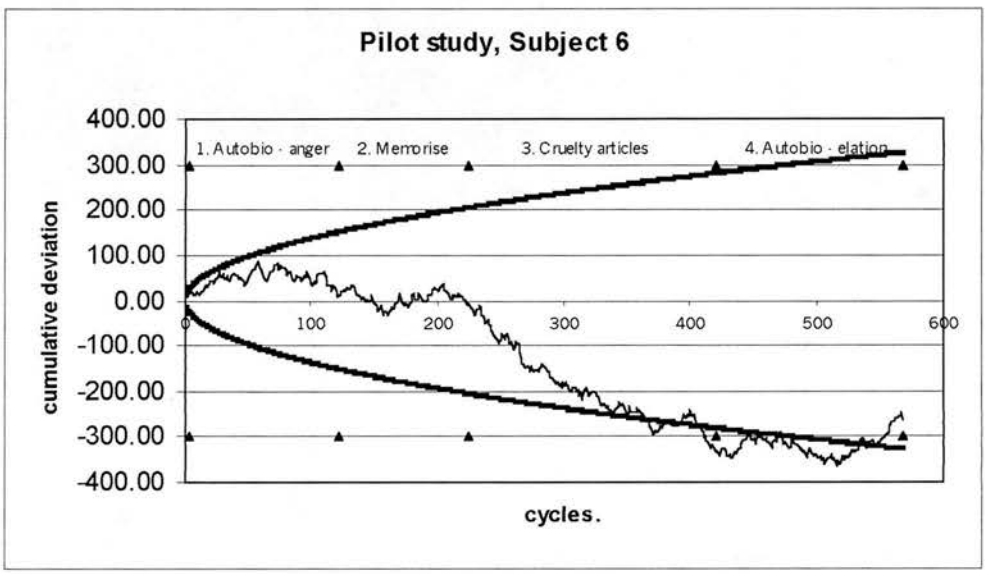
A pilot study was run, primarily to check that the workbook's structure succeeded in producing anger and elation; 9 undergraduate subjects (6 female, 3 male) were tested, none of whom belonged to an Animal Rights organisation but all of whom expressed concern for animal welfare.

Results

Each subject trial yielded RNG data that can be cumulatively summed over time as per chart 3.1 below. The upper and lower parabola represent Stouffer Z scores of (+/-)1.96 corresponding to (two-tailed) p values of 0.05, and the labelled sections relate to the time spent completing that section. RNG data collected during the 'introduction' to the workbook, as well as any cycles collected after the final page,

have been precluded from analysis because of short run bias (just a few cycles during the cover page) and confound (subjects failing to stop the RNG correctly).

Chart 3.1 – RNG output, subject 6, parabola represent 0.05 level (two tailed)



As can be seen from the chart above, RNG data from subject six shows a substantial downwards deviation over the course of the trial, and that most of this is due to activity during section 3 (reading the cruelty articles). The number of cycles closely corresponds to the length of time the subject took to complete a section.

Table 3.2 – Pilot Results

***Animal Welfare* Experiment - Pilot Results**						
All Ss	**standard deviation: 6.975**					
Stimulus section	deviations	cycles	Stouffer Z	p (2 tail)	Chi Square	p value
1. autobio - anger	-112	817	-0.562	0.574	2.42	0.98
2. memorise	-149	307	-1.219	0.223	5.61	0.78
3. cruelty articles	-703	2602	-1.976	0.048	16.18	0.06
4. autobio - elation	103	1222	0.422	0.673	8.75	0.46
all data	-861	4948	-1.755	0.079	8.13	0.52

These results show a significant deviation in RNG output as subjects worked through the cruelty narratives, culminating in a significant terminal stouffer z of -1.976 (e.s. 0.039). Chi square analysis returned a p value of 0.06 suggesting that direction was slightly more prevalent than outright variance

anomaly. The Autobiographical recall induction did not show a significant effect, although it followed the same negative trend as the cruelty articles. Interestingly the Autobiographical Elation MIP runs in the counter-direction to anger, these directional effects (whereby one defined emotion runs in one direction and another in the opposite direction) were also reported by Blasband (2000). Section two, where subjects were instructed to memorise the associated emotional words shows a sizeable negative trend, although conclusions should be seen as speculative due to the potential bias of short runs. When summing up the trials as a whole, it seems legitimate to point out that the first three sections (which are underpinned by negative angry emotion) all hold downward shifts. When subject data is looked at individually, there were no independently significant trials. When the anger sections synonymous with anger induction (parts 1, 2 & 3) are combined, the net deviation of –964 bits relates to a terminal stouffer z of –2.264 (p=0.02, e.s. = 0.037). Results allow for the acceptance of the formal hypothesis, in relation to section 3, but a rejection in relation to section 1.

The mood scores, which rated subject's opinions to the animal cruelty, allowed the data to be divided into two groups – by adding their values and then using a cluster technique, participants formed two distinct sets, those with 'low/no anger' (range: 0-3 on anger scale) and 'high anger' (range: 8-11 on anger scale). The results are shown in Table 3.3.

Table 3.3 – Subjects split into high and low groups

High Anger - 7 Ss						
Stimulus section	deviations	cycles	Stouffer Z	p (2 tail)	Chi Square	p value
1. autobio - anger	-58	638	-0.330	0.742	2.09	0.95
2. memorise	-177	256	-1.590	0.112	5.11	0.65
3. cruelty articles	-801	2202	-2.454	0.014	15.35	0.03
4. autobio - elation	243	1078	1.064	0.288	5.30	0.62
All data	-793	4174	-1.764	0.078	7.97	0.34
Low/No Anger - 2 Ss						
Stimulus section	deviations	cycles	Stouffer Z	p (2 tail)	Chi Square	p value
1. autobio - anger	-54	179	-0.580	0.562	0.33	0.85
2. memorise	28	51	0.564	0.572	0.50	0.78
3. cruelty articles	98	400	0.704	0.482	0.83	0.66
4. autobio - elation	-140	144	-1.677	0.094	3.45	0.18
All data	-68	774	-1.019	0.308	0.16	0.92

The division shows how subjects who reported being especially incensed by the cruelty narratives, affected the RNG much more substantially than those in the low anger group. When these seven subject episodes are cumulatively summed, they provide a p value of 0.014 (e.s. = 0.052). The two individuals in the low anger group, whom claim not to have been affected by the cruelty articles proceeded to produce a strong trend during the elation condition (p=0.094) although short run bias may cloud any true effect.

Formal Study.

Table 3.4 Formal Results *(Subject 10's data removed because of aforementioned procedural errors).*

***Animal Welfare* Experiment - Formal Results**						
All Ss (16)	**standard deviation: 7.056**					
Stimulus section	Deviations	cycles	Stouffer Z	p (2 tail)	Chi Square	p value
1. autobio - anger	669	2697	1.826	0.068	25.821	0.057
2. memorise	77	749	0.399	0.690	11.042	0.807
3. cruelty articles	-305	4172	-0.669	0.503	19.334	0.252
4. autobio - elation	616	2664	1.691	0.091	19.632	0.237
all data	1057	10282	1.477	0.140	14.292	0.577

Table 3.4 (above) shows the formal study data. Unlike the pilot study which saw significant RNG activity during the cruelty narratives, no such effect was visible here. Instead it is the autobiographical recall sections that shows sizeable deviation both for anger (p=0.068, e.s.= 0.035) and for elation(p=0.091, e.s.= 0.033), in the same positive direction. A positive trend emerges from all episodes, represented by a p-value of 0.14. As mentioned, analysis requires a two tailed level of probability (SZ +/- 1.96), which only two subjects (numbers 3 and 5) managed to exceed; their cumulative graphs are shown below in chart 3.2 and 3.3.

Chart 3.2 - subject 3

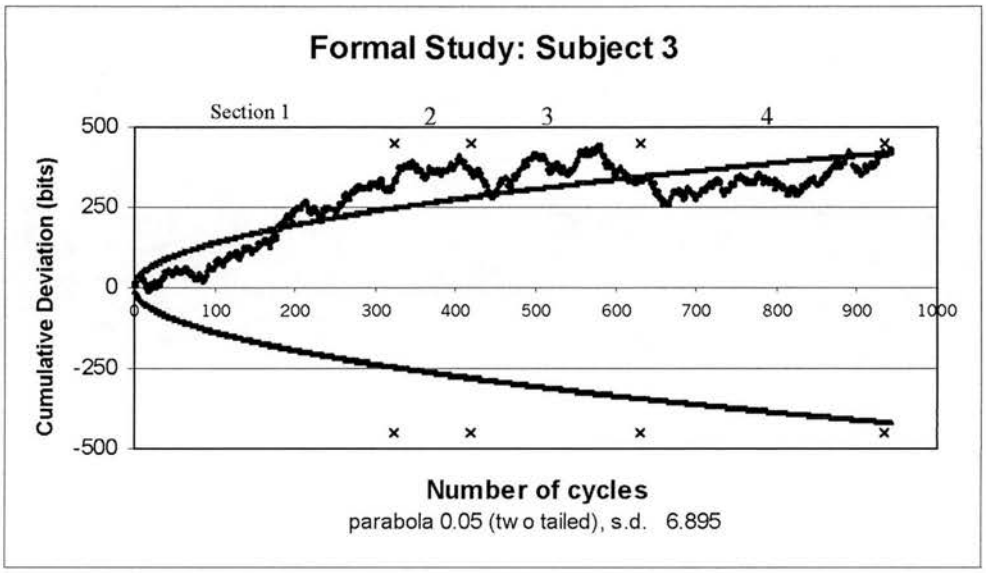
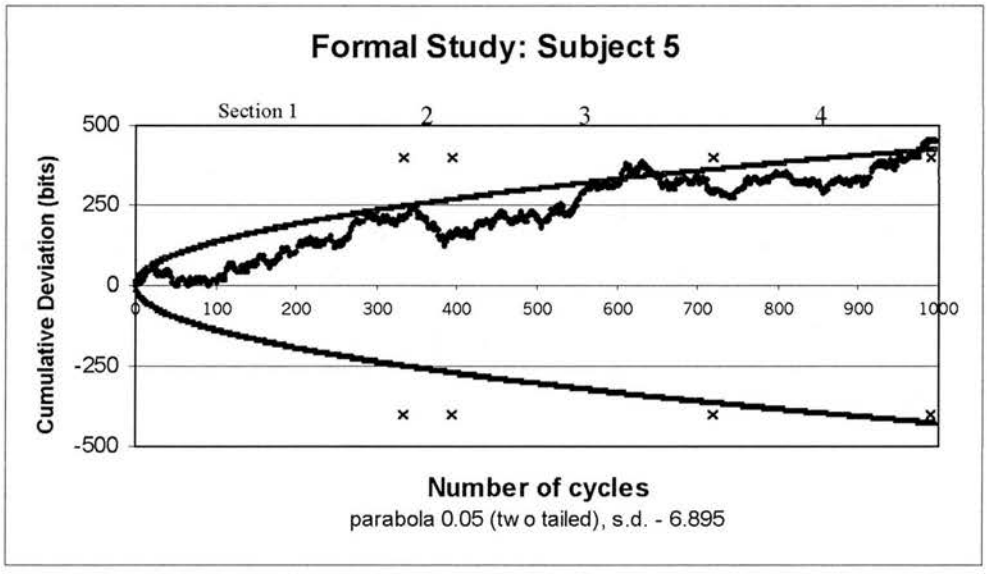


Chart 3.3 – subject 5



As with the pilot study, a clustering technique allowed the participants to be divided into high (range: 10-12 on anger scale) and low anger (range: 0-6 on anger scale) groups. Table 3.5 beneath shows the results.

Table 3.5 – Subjects split into high and low groups

High Anger - 12 Ss						
Stimulus section	deviations	cycles	Stouffer Z	p (2 tail)	Chi Square	P value
1. autobio - anger	478	2162	1.457	0.145	16.781	0.158
2. memorise	92	599	0.533	0.594	8.904	0.711
3. cruelty articles	-429	3292	-1.060	0.289	17.294	0.139
4. autobio - elation	384	2008	1.214	0.225	17.323	0.138
all data	525	8061	0.829	0.407	8.208	0.769
Low/No Anger - 4 Ss						
Stimulus section	deviations	cycles	Stouffer Z	p (2 tail)	Chi Square	P value
1. autobio - anger	191	535	1.170	0.242	9.039	0.060
2. memorise	-15	150	-0.174	0.862	2.137	0.710
3. cruelty articles	124	880	0.592	0.554	2.040	0.728
4. autobio - elation	232	656	1.284	0.199	2.309	0.679
all data	532	2221	1.600	0.110	6.084	0.193

Results from this differentiation are much harder to interpret than those from the pilot data. Both high and low groups show positive trends (as per Z tests) during sections 1 and 4. Overall, the low anger subject group terminates with an overall SZ of 1.600 but no one particular section can be considered liable, as the positive deviations draw across parts 1,3 and 4.

Discussion.

On the face of it, the induction of an anger state across subjects in the experimental group looked particularly successful, with three-quarters of the participants, reporting very high anger levels. These levels were achieved without the use of explicit instructions to enter any particular state (which should have reduced demand effects), however there may be some sense in providing explicit instructions in future experiments to boost the effectiveness rate even further. One reason why the induction 'only' worked in 75% of subjects became clear during the debriefing. It seemed that nearly all the tested

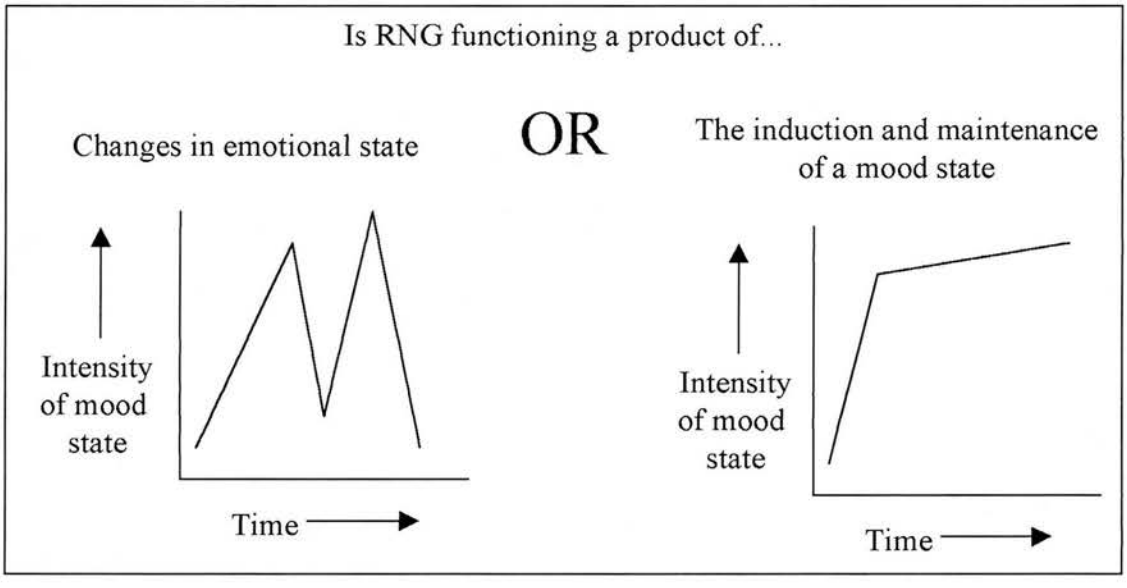
activists were familiar with the Kitten story, whilst a sizeable majority were also aware of the Hedgehog case. Although it may not be the case of familiarity breeding contempt, there seems little doubt that the impact of the narratives was diminished, as subjects had already 'come to terms' with the events detailed. Such findings can be compared against the pilot group, whose subjects were naïve to the cruelty reports, and in retrospect, it may have proved more beneficial to have used a naïve subject pool (which held an informal interest in animal welfare), as they would probably have been less aware of specific cases. This does not mean that the experimental participants took the matter more lightly than they would be expected to - subject 5 for example, was still in a highly agitated mental and physiological state at the time of the debriefing. She referred to the articles and intoned that she would be prepared to 'execute' people personally, who behave badly towards animals, a view that might be considered somewhat ironic. This participant also served to highlight how important a post-experiment debriefing is, in terms of explaining the rationale and reducing any emotional residue. The subjects categorised as low anger, also expressed ire, but this was to a lesser degree, and the primary emotion reported was pity. A common attitude was that the perpetrators were 'ignorant' or 'knew no better', and that we should show 'understanding' towards them.

When subjects were asked to write about an act or incident that them 'truly angry', the widespread response amongst the experimental group was to utilise examples of animal cruelty. These included 'political' issues such as hunting or battery farming as well as personalised smaller scale episodes, e.g. a neighbour who mistreated his dog. The elation recall, on the other hand nearly always revolved around idiosyncratic familial events. This suggests that positive mood inductions might benefit from sticking with personalised episodes and not using the same universalised stimulus with each and every subject. One additional point regarding the autobiographical sections was that the recall of pertinent episodes provoked anxiety in a small number of participants, as they struggled to come up with meaningful examples and worried that they were not completing the experiment very well. Such a problem highlights how affect can easily become blended across individuals.

In terms of PK effects, these results give some confidence to the notion that emotional episodes propagate mind-matter interactions. Whilst the pilot group data was exceptionally strong, results from the experimental group showed that it might not just be negative mental states that facilitate PK, as

both autobiographical recollections of anger *and* elation showed similar effects. Additionally, the control periods from the pilot study also threw up some interesting data. Whilst it is worth noting that they were part of what might be considered a single induction phase, the question of whether RNG perturbations are due to the *changes* in emotional state (e.g. neutral to angry and back) or whether they are due to the maintenance of a particular state, needs to be considered. See schematic 3.1.

Schematic 3.1 – two approaches to RNG and mood.



Some observers might suggest that the positive results seen here are due to special qualities (e.g. heightened empathy, concern) that people who care for animals have. Thus there might be some profit in testing other groups that hold commonly shared beliefs. Whilst this seems sensible, the difficulties experienced in recruiting the relatively few 17 subjects for this experiment suggests that such an approach could prove especially arduous. In turn, there may be better generalisability in using entirely unselected, non-specialised target pools and simply employing alternative mood induction procedures.

Analysis of the RNG data in this chapter raises an issue that is pertinent to experimental data from the thesis as a whole: namely multiple analysis. Multiple analysis can be considered in two ways. Firstly where the same batch of data is repackaged and reanalysed, providing multiple opportunities for significance to be unearthed prompting potential accusations of data-mining. In the second case

multiple data sets might be analysed, only some of which are significant, prompting moves towards subjective inferences. One should also remain aware that when lots of analyses are carried out (perhaps 200), 5% of these are likely to be significant by chance. One means of correcting for multiple analysis, which has been used in some RNG studies, has been to make a Bonferroni adjustment, where the alpha level is divided by the number of statistical tests being run on the data. This produces a highly conservative measure, and the author (in consultation) decided that such a transformation was too extreme, fearful that meaningful data might get washed out.

Throughout this thesis, the author has taken care to minimise the reworking of the same batches of data. On the rare occasion such as above where the same batch of data was redesignated, it should be made clear that the decision was made whilst the experimenter was still blind to specific trial outcomes. Further discussion regarding multiple analysis is included in the final chapter.

That the experiments generally conformed to the author's pre-experiment expectations is a cause for comfort but also concern. Brief discussion has been made, that PK effects might be due to the goal seeking of the system operator (facilitated by anomalous cognition (e.g. DAT) or causal PK), and it may be that these results were due to just such an effect. After all, parapsychological research has demonstrated how researchers with positive views of psi such as Charles Honorton tend to generate positive results, whilst those who are less inclined to endorse psi, produce null effects. Thought therefore needs to be turned towards understanding the role of the experimenter/system operator in the relationship with subject and RNG.

Positive results, as found in the previous chapter tend to raise more questions than they answer. How much of the RNG's behaviour can be attributed to the protocol and subject? How much was due to the experimenter, who was outside the test area and blind to the subject's task progress? Is the system operator some kind of linking mechanism between the RNG and the participant? Is the real source of anomaly outside any form of conscious control?

Previously, researchers have suggested that at least some of the anomaly within an RNG output can be attributed to the experimenter. Both Dean Radin (1989), and Robert McConnell (1989) have claimed to have found experimental signatures/effects within their data, suggesting that the researcher is at least *partially* responsible for the data structure. As McConnell concludes: *"It has been experimentally demonstrated that the experimenter can cause concealed and unintended psychokinetic effects even while absent from the laboratory room containing both the target apparatus and the ostensible subject and while unaware of this momentary configuration of that apparatus... A reasonable answer is now known: The experimenter contaminates his or her own data"* p225. However, the point of influence is open to debate, as RNG activity, being subject to the divergence problem discussed in the opening chapter, could be influenced by anyone connected with the experiment, e.g. subjects, experimenters, journal reviewers, journal readers etc. Although the working hypothesis holds that anomaly stems primarily from the subject, it would seem sensible at this point to consider PK in terms of mechanism and source.

There are several ways of explaining RNG anomaly. The first possibility, (which can be discounted because of unfalsifiability), is that all possible events actually take place, as per the Many Worlds Hypothesis. Therefore, all mind-matter effects are artefactual and a significantly anomalous event, is just the result of an infinite quantity of possibilities, not any specific interaction between agent and system.

Next, one might suggest human consciousness can be removed from the system entirely. Perhaps RNGs are passive systems, not influenced by human consciousness, rather by the 'operation' of some

removed system. This system either operates on the RNG directly (perhaps through an entanglement paradigm) or on the space-time that the RNG inhabits. After all, Watkins Watkins & Wells' (1973) experiment with anaesthetised mice showed how particular parts of space-time appeared to be subject to PK, not necessarily the target mice. This hypothesis holds two problems, firstly if true, it is pretty much impossible to test currently. Secondly, empirical studies seem to show that under laboratory conditions, the manipulation of independent variables correlate (to some extent) with anomalous RNG outputs. Of course, precognitive explanations for PK might decree that experimenters use ESP to predict the interaction between a RNG and the removed system. The concept of systems independent to consciousness being responsible for RNG perturbations should not be readily dismissed.

Precognitive explanations can also be invoked under a simpler format. As discussed in the introduction, PK is seen by some theorists as an ESP effect, wherein the system operator scans the RNG output and chooses a fortuitous time to sample anomalistic data. Results from DMILs and larger system (e.g. dice) measuring devices present such explanations with difficulties. Alternatively one can view PK, as per its truest definition as a causal force. The causal hypothesis can subdivided into 2 further (although not mutually exclusive) approaches. Firstly, that PK is a result of conscious volition, secondly that anomaly stems from unconscious processing.

Finally one could invoke a multi-factorial model of PK whereby external variables act in conjunction with sources of consciousness. Previous research has examined links with Geomagnetic Fields, and Local Sidereal Time (Spottiswoode 1997; May 2001) and multi-factorial approaches that incorporate such effects might go some way to explain the elusive nature of psi.

One might also consider here, collapsing the ESP/PK dichotomy. Since both ESP and PK are fundamentally defined by their outcomes, perhaps we should view them as complementary parts to the same unified mechanism, where ESP converts information into a psi format and PK transmits it. It may be that any carrier signal, conveying information from a separated entity, has certain physical properties that interact when directed against some third party system (such as the RNG). Since the signal is fundamentally informational, the binary protocols established to measure PK lose the informational richness contained in the signal.

Taking the working hypothesis that consciousness is predominantly responsible for affecting a random system, one needs to consider the division between intentional/conscious and non-intentional/unconscious effects, both from the subject and the experimenter. Imagine an intentional experimental protocol (e.g. subject instructed to alter the behaviour of an RNG in a pre-determined manner), which has produced a statistically significant output. Even if the experimenter is blind to all conditions, he might still exert a retro-active influence at any later stage. If the experimenter 'really wants' a specific outcome, might the role of the subject diminish to negligible levels? Since research can be considered the property of the scientist, from a motivational perspective, it is the researcher who *really* has the most to gain or lose from the experiment. Research carries the baggage of expectancy and validity, and delivers professional achievement and failure (effecting status, income, satisfaction etc). So one might witness occasions when the experimenter wants or needs statistically significant experiments, and brings his own unconsciousness to bear upon the system, thus ending up with (generally speaking) results that confirm his view. Such a theoretical scenario, fits neatly with teleological models of psi (e.g. Schmidt 1975) and could go someway towards explaining why some researchers consistently produce positive results whilst others do not.

Unconscious experimenter desires should not be thought of as one-dimensional (e.g. success versus failure), more as a function of motivations, goals, intentions and assessments. A researcher may want positive results in a predicted direction, but with a small effect size (as a large one looks suspicious), or null results to negate an unpopular theory. Alternatively, new approaches offering paradigm change, may initially produce exceptional results because of heightened belief and enthusiasm. Replication by less 'persuaded' colleagues who do not share the researcher's conviction conversely end up null.

On the contrary one might argue that it is only the subject affecting the system, and there is no experimenter effect. Herein, RNG results are due to the interaction between subject and device, and are influenced by the ability, belief and psychological set of the subject at the moment of testing. Between the two extremes, lies a point where both the researcher and the participant have some joint effect upon the system, and it may be this *triad* that gives rise to the directional anomalies witnessed.

Covert measuring protocols present further difficulty. Suppose a subject is entirely unaware of the measuring system, their apparent role in the experiment, for example, being the completion of a frustrating puzzle. Under this scenario, the subject's consciousness could be modifying the RNG inadvertently, a by-product of struggling with the task. Maybe the test proves so vexing that stress is unconsciously released through psi, and manifests itself within the RNG?

Alternatively, one could speculate that under a covert protocol, there needs to be a link between the subject and the RNG system, conveniently facilitated by the experimenter, who is akin to a router in a network. The experimenter may be an absolute necessity in bringing about an effect, and sceptical researchers produce null effects because they prevent this linking. A further consideration is the confound that under most covert protocols, participants are informed after testing about the RNG and thus might exert retro-PK effects based on their *true* belief into the validity of psi.

However psi manifests, there exists the strong likelihood that the experimenter plays some role; and since the experimenter can never be fully removed from the system, one needs to clarify the nature of the interaction. There is *no use* inferring the nature of positive results with subjects, if no effort has been made to determine the impact of the system operator and thus the following experiment was devised to give an idea of the level of PK effects the author might contribute during participant testing.

Although the experiments in this thesis use emotional stimuli to effect subjects, the experimenter during testing is not subject to deliberate shifts in emotion. In fact, the need to maintain blindness removes him from any interaction with subject or RNG during sampling and one should consider his state as emotionally neutral (at least on the surface). Thus this experiment did not seek to examine how experimenter emotion might influence the RNG, rather to see how his volitions impacted across various conditions.

Method

The experimenter acted as sole participant and operator to the RNG system. The RNG was managed by a purpose-built computer program, that matched randomly derived integer values either automatically

(conditions 2 and 3) or under the guidance of the operator (condition 1). Each of these conditions comprised of 1000 trials.

In condition 1, the computer sampled the RNG for 1 byte of data (a value between 0 and 255) which was then flagged as the 'target' value. The experimenter wrote the target value on to a recording sheet and after a short built-in delay, the RNG system reactivated and sampled additional bytes of data at a rate approximating 16 bytes/second. The system stopped when a newly generated byte matched the previously mentioned 'target'.

e.g. *figure 4.1*

Target	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 179
202	199	12	86	249	3	**202**

'Target' byte of 202 matched in 179 cycles

As each byte was generated, it was printed and scrolled down the left-hand side of the computer monitor. Alongside this was printed the cycle number, representing how many bytes had thus far been generated. The speed of data generation and therefore data scrolling, meant that the value of each freshly generated byte and cycle number were both on the edge of conscious perception. When the system halted due to a match, the number of bytes generated was manually recorded by the experimenter.

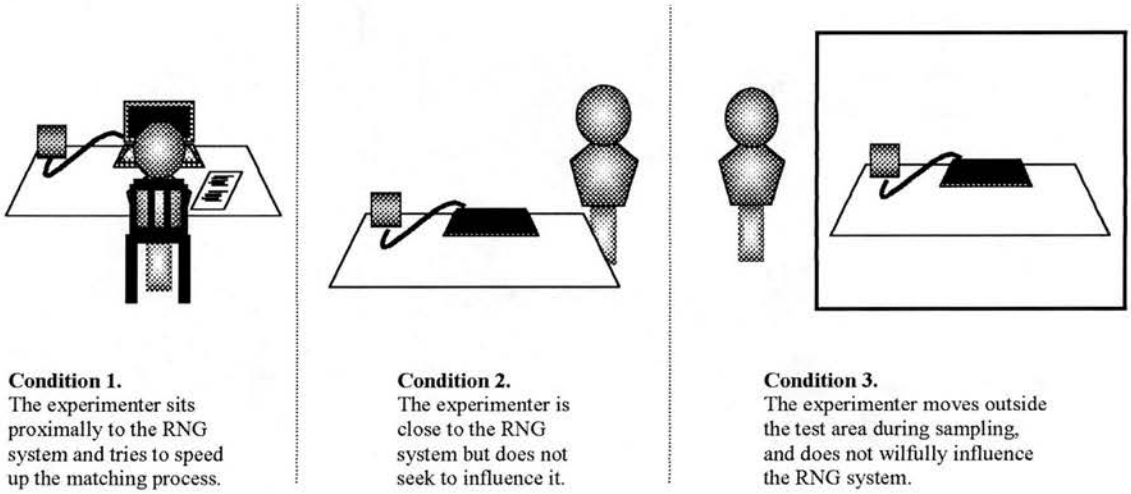
Since the experimenter knew the value of the target number, there was a conscious intention to interact with the RNG to 'reduce' the number of cycles generated before a match was made, shortening the time a trial lasted. A pre-determined number of trials (typically 30) would be carried out, before the experimenter moved on to testing under conditions 2 and 3. A minimum, although somewhat arbitrary time period was taken between the trials for each condition in order to minimise potential lingering effects.

In condition 2, the whole process was automated, but feedback was prevented by closing the laptop's monitor. The experimenter was situated proximally to the sampling system but had no knowledge of

what the target number should be, furthermore there was no conscious intention to bolster the system into producing a match. The system would be run for a fixed period of time, then manually stopped.

In condition 3, the same protocol as above was used, whereby the whole sampling system was automated; this time however, the experimenter removed himself from the experimental area entirely. A lag was built into the sampling process to enable the room to be vacated. Once again, no conscious intention, on the part of the experimenter, was made. The system would be run for a fixed period of time, and manually stopped upon re-entry to the testing room. The last trial was always discounted to avoid the possible confound upon the system, of entering the room.

Schematic 4.1 – experimental setup



Condition 1.
The experimenter sits proximally to the RNG system and tries to speed up the matching process.

Condition 2.
The experimenter is close to the RNG system but does not seek to influence it.

Condition 3.
The experimenter moves outside the test area during sampling, and does not wilfully influence the RNG system.

The schematic above demonstrates the set-up for each condition. Mean chance expectancy dictates that a match should be found on average, across any condition, once every 256 cycles.

What positive results might indicate.

1. If experimenter knowledge and intent boosts psi functioning (manifested either through ESP or PK in the RNG) then condition 1 should show significant (independent or intergroup) variation whilst neither 2 nor 3 do.
2. If it is the *presence* of a conscious system, (the experimenter), that influences the RNG system, then conditions 1 and 2 should show anomalies.

3. Should condition 3 prove significant at all, support is given to the idea that physical distance from the measuring system is not a significant factor, as already posited (e.g. Dunne and Jahn, 1992).
4. If DAT is in operation there should be significant deviations from mean chance expectancy across conditions.

The results from this experiment have significance for all experiments that I run, if anomalous results are produced here then much greater attention must be paid to the effect I have over RNG behaviour in multi-subject conditions. Would the RNG data conform to my beliefs through unconscious means? Would I unconsciously constrain the data so it did not look too unusual? Would my motivation wane and the results suffer as I lost interest? Might my consciousness inadvertently affect conditions 2 and 3 - deliberately lengthening their run times? If results did not conform to my expectation in condition 1, would a build-up of frustration lead the RNG to shift in the opposite direction? There were so many potential factors at stake, that for the sake of efficiency, I decided to primarily engage post-hoc analysis. As such only 1 formal hypothesis was stated pre-experiment.

Hypothesis.

Condition 1, would show a significant reduction in the number of cycles needed to pair the target value with the matching value.

Results.

Table 4.1 - Results

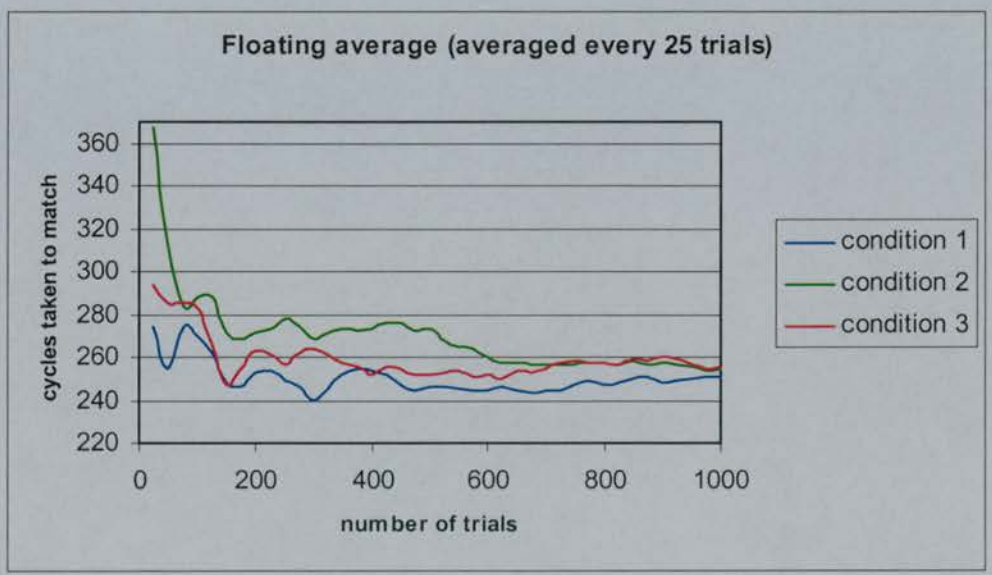
	Condition 1 Present. Intent.	**Condition 2** Present. No intent.	**Condition 3** Not present. No intent.	**Collapsed data.**
Trials	1000	1000	1000	3000
Mean	250.75	254.39	255.19	253.44
Median	179.00	172.00	177.50	177.50
Standard Deviation	248.46	255.22	238.80	247.51
Range	2082	1745	1502	2082

Overall, the collapsed data shows that these protocols produced a match every 253.44 cycles, which is marginally faster than mean chance expectancy would predict - in fact, each of the conditions matched their target values faster than chance likelihood. Condition 1 at 250.75, proved most effective, whilst conditions 2 and 3 (marginally below chance expectancy of 256) had little to separate them. N.B. It

should be pointed out that the distribution around this expectancy value follows a geometric distribution. Whilst the left hand tail is effectively capped at the zero point, the right hand tail is under no such constraint. As such this tail can become strongly skewed as the target matching can extend indefinitely. However, central limit theorem predicts that as the number of measurements increases, net skewing effects diminish and the distribution becomes normalised. The reader will note that there are 1000 trials per condition and these should facilitate fairly normal distributions, as such, the t-test applications below are valid. None of the conditions showed significant departures from theoretical expectation, condition 1 for example, returned (t)-0.668, (df) 999, p=0.504 (2-tailed) on a single group t-test. Condition 3 which is the closest to a control condition had the tightest variance, represented by the standard deviation of 238.80, (compared to 253.44 overall).

Although the terminal results seem to show no real effect, insight can be taken from the graph of each condition through the experiment. The chart below (4.1) shows the cycles needed to match, as a standing average. E.g. every 25 trials, all data available at up to that stage was included in analysis.

Chart 4.1 – averages across conditions



The chart shows how initially condition 2 massively exceeded m.c.e. and data from the two other conditions. In fact, it is not until around 600 trials have taken place, that there is a convergence across conditions. Throughout the data (less one or two points), condition 1 maintains its position as the most conducive protocol for matching RNG bytes quickly. What such a graph illustrates, is that under a

protocol with far fewer trials, apparent psi effects might stand out. Should statistical balancing (as per Pallikari-Viras 1993) or any other constraining mechanism be at work, it might be construed that multiple trials are required before equilibrium is restored, and that experimenters may prefer to concentrate on methodologies that utilise fewer trials, allowing their measuring systems to operate with reduced hindrance. Such an approach would obviously have to incorporate attention to short-run bias, but may allow anomalous effects to show up more easily.

Discussion

This experiment was primarily conducted to examine my role as a convincing source of PK. If these results can be considered generalisable, they suggest that overall I can scale back concerns into my psi contributing significantly in multi-subject experiments. This would allow positive results from future experiments to be attributed more readily to the subject and experimental conditions. Of course, I have made much light of the importance of unconscious motivation. Perhaps I did not want any significant effects? After all, if I were the source of psi, the validity of a standard empirical approach would be greatly diminished. In addition, it may be that these results, showing low order experimenter effects, are less applicable under experimental conditions with subjects, as the dynamics of the research are fundamentally different.

One further point is that condition 1 may have been influenced in places by frustration. As reported in chapter 1, Mischo & Weiss (1973) found that frustration might have a role to play in mediating PK. If volitional trials can be thought of as teleological, a failure to match the target value quickly might lead to frustration, which in turn impacts upon psi functioning. The author can report that several trials in this condition brought out such a state, as the RNG failed to match the target promptly. This frustration rapidly gave way to irritation as feedback showed the cycle number increasing. A future experimental direction might be to cap the upper end of each trial at mean chance expectancy, producing a hit or miss protocol, and to increase the sample rate of the RNG so that each trial takes just a fraction of a second. The hit or miss results could then be kept blind to the subject thus depriving him of the information needed to generate frustration.

Since this study has failed to show evidence for the author being a source of anomaly, efforts can once more be directed towards the induction of mood within a test population and the effects that has upon RNG functioning.

Results from chapter 4 suggested that experimenter effects from this author at least, may not be too great an issue. Therefore a continuance in examining how mood can influence mind-matter interactions in subjects is viable. Chapter 3 used emotional memories and narratives to manipulate mood but also gave reference to the popular experimental procedure known as the Velten.

In 1968, Emmett Velten Junior published a paper detailing a new methodology in mood manipulation, a procedure that according to Westermann et al. (1996) has gone on to become the most widely used induction procedure. *The Velten*, also known as the *VMIP* or *VIP*, has been widely adapted through the years, but the fundamental notion remains: the reading of printed self-referential statements, combined with instructions to 'feel' the statement described, can induce genuine mood shift in the reader. Velten used three sets of sixty self-referential statements for depression, elation and neutral conditions, ordered so that a structured progression through the cards shifted mood from a low to high order. Under an experimental protocol, a subject would silently read a statement and then read it aloud (e.g. for depression: *"I have too many bad things in my life."* or elation: *"It feels great to be alive!"*. The control cards consisted of neutral non-self-referent statements such as *"Utah is the beehive state."* Under the original VMIP procedure, a subject was assigned to one of the experimental conditions and asked to read through the cards moving onto the next one every 20 seconds, Zuckerman & Lubin's (1965) Multiple Affect Adjective Check List (MAACL) measured mood shift.

Velten was interested in how mood change affected behaviour. Typically, research prior to 1968 had focussed on examining how cognition could affect mood, but Velten's approach now provided a means of reliably generating mood states enabling an examination of cognitive activity. As Teasdale and Fogarty (1979) surmise: *"This method has been shown to affect self-report, psychomotor, word association and speech indices of mood"*. p249, such that subjects under depression conditions, report more negative events, tend to write and speak more slowly and take longer to make decisions. Such effects have been replicated on many occasions, e.g. Coleman (1975) who looked at multiple measures including social interaction, psychomotor speed, and the free association of words, finding differences between depressed and elated respondents.

Since its inception, a sizeable body of research has employed the Velten when examining links between emotional state and behaviour. Natale (1977) used it to successfully induce dysphoria and elation and found that mood state correlated with gaze behaviour - subjects engaged in a ten minute discussion by a confederate held their gaze for significantly less time when in a depressed state.
Alloy et al (1981) used a mildly adapted version of Natale's VMIP procedure in an illusion of control experiment. Eighty female subjects, half of whom were naturally depressed, were induced into happy and sad moods. The experimenters found that these naturally depressed women overestimated how much control they had on an event that was outside their control.

In 1982, the Velten was used by Snyder and White, who sought to investigate Beck's (1967) observation that clinically depressed patients had a higher frequency of negative thoughts. Having induced depression in an all female subject pool, Snyder and White asked their participants to recall past experiences, subsequently reporting: *"The outcomes of this series of experiments, taken together with related demonstrations... clearly suggest that when individuals reminisce about their lives they differentially remember those events and experiences whose affective quality is congruent with the current mood states."* p165. In a conceptually comparable experiment, Riskind, Rholes & Eggers (1982) used the VMIP to induce depression and found similar mood congruent effects whereby negative events were recalled more readily than positive events.

Despite the VMIPs popularity, lively debate as to its effectiveness has persisted. Two studies, (Strickland, Hale & Anderson, 1974; Hale & Strickland, 1976) both provided strong support for the VMIP's ability to successful induce elation and depression, but others such as David Clark (1983) have suggested that between 30 and 50% of subjects failed to respond to the VMIP. Martin's (1990) review of chosen MIPs, calculated that self-referential statements were effective for 47 % of the time in the depression condition, 26% for anxiety and 40% for elation. Alternatively, Gerrards-Hesse et al (1994) suggested that for inducing depression, the VMIP was successful in 80% of *studies*, whilst the induction of elation was somewhat less successful, proving effective 67% of the time.
In one further review, Westerman et al.(1996) also found this elation-depression divergence. They also attempted to determine why there was such a disparity in effectiveness rates between researchers and

noted: *"...in interpreting the success rates one has to keep in mind that they are average scores from studies varying considerably in their operational definition of success." p561*

Aside from the issue of effectiveness, the main talking point with the VMIP has been that of demand characteristics, whereby subjects moderate their behaviour and task performances in line with experimental expectations. Some researchers (e.g. Buchwald, Strack & Coyne, 1981 and Polivy & Doyle, 1980) have been so concerned that the VMIP is subject to demand problems that they even gone so far as to recommend not using it. To purportedly test demand characteristics, Velten in his original study included a condition whereby subjects (shown 5 sample cards) role-played how they felt others would behave after sixty cards, no differences on the behavioural measures or self-reports showed up, and Velten concluded that shifts witnessed under experimental conditions were therefore genuine.

Buckwald, Strack & Coyne (1981) did not consider Velten's role-play condition suitably emotive, and queried its validity in addressing demand effects properly. They wrote "[there is a]...*critical difference between merely saying something to oneself and believing it*". Within their experiment, subjects were told to act in elated or depressed manners whilst doing their utmost to avoid feeling any real emotion. In addition, subjects were told that their acting should be so effective that any third party observer would not be able to tell they were faking it. Buckwald et al. then compared these two demand conditions against a neutral mood VMIP and found that their role-play conditions had similar scores, implying that there had been no emotional change during role play (i.e. that the role play was affectively neutral.) Although the researchers also found significant differences between the VMIP depression condition and the role-play one, they failed to find any differences in performance measures which were previously associated with Velten induced states; and therefore found themselves unable to reject demand characteristics as the root cause of the VMIP effect. The obvious problem with such an inference is that it relies upon the premise that *mood must always affect performance* - which plainly it need not do. In fact, the literature into behavioural effects as measures of mood change has failed to provide any firm conclusions (see Kenealy 1986, Larsen & Sinnett 1991), especially since behavioural measures are subject to individual differences and local variables. Perhaps self-report measures seem to correlate better than behavioural measures because they actually focus on the phenomenology of affect, which is inherently accurate, whilst behavioural measures remain somewhat disassociated?

The other primary means of measuring affective change is through self reports. Clarke's (1983) supposition that subjects on self-reports have a greater opportunity to fake their responses is certainly valid. Slyker & McNally (1991) addressed just this point when they compared several mood inductions. Although they found that instructions to enter a specific mood were as effective in changing mood as the VMIP and Musical Mood Induction procedure, they are resultant upon idiosyncratic strategies which nearly always cause change in other non-target emotions. Some discussion has already been made suggesting that real-world emotions tend to be blended, as such, shifts in non-target emotions provide support for the idea any reported changes to affect are genuine. To put it another way, if demand effects are in operation, it is unlikely that other moods will have changed: *"It is implausible that subjects in a depressed mood induction, for example, 'fake' a change* [on the sadness scale], *and then realising that anger often accompanies sadness in depressed psychiatric patients, fake a change* [on the anger scale] *as well."* p43.

Pamela Kenealy (1986) looked at 46 experiments and addressed the lack of agreement that seems prevalent in studies between researchers. She observed that research into the VMIP's effectiveness and the role of demand is *'inconsistent and equivocal'*, and *'reflects a lack of experimental precision'* p331, implying that definitional and operational sloppiness had 'muddied the waters'. In turn Kenealy felt that Buchwald et al's recommendation to abandon the VMIP was misplaced. She explained that although demand is very difficult to remove altogether, normally it just created: *"...a degree of additional effect on top of a true mood induction effect."* p331

Polivy & Doyle (1980) also held reservations into the VMIP, suggesting that since Velten was not blind to the experimental condition, he may have *"inadvertently presented subjects with a 'a demand not to produce demand effects'* " p287. To examine effects, data was compared from normal VMIP trials with those where subjects attempt to 'feel' the opposite of the Velten instructions. Neither of these counter-demand conditions differed significantly, leading Polivy and Doyle to conclude that demand characteristics were integral to the VMIP. Taking umbrage with this approach, Finegan & Seligman (1995), asked how a subject reading a positive mood statement, could possibly produce a genuinely opposite mood and not be confused(!). They cite Berkowitz & Troccoli's (1986) explanation

of the VMIP, as an emotional priming technique, and suggest that memory linkages would not have been activated by the counter-demand subjects. In their own experiment, Finegan & Seligman primed their subjects with the expectation of positive or negative mood shift provided by the mood statement procedure, i.e. subjects were told: 'these statements have been found to be successful at mood depression'. In actual fact subjects were given neutral statements (referred to and described as 'a placebo'). They found that despite the priming, there was no significant mood shift, ergo, no demand effects.

It seems fair to conclude that criticism of the VMIP has been overstated. The majority of studies affirm the VMIP as a genuine mood manipulation technique, and whilst demand is bound to exist, Berkowitz & Donnerstein (1982) are probably right when they suggest that these are too weak and rare to account for Velten results overall.

Since Velten's initial experiments, the VMIP has been widely adapted, and one of the most common modifications has been to the *number* of statements. Schare & Lisman (1984), for example, used a combination of 50 and 25 statements over successive days, whilst Richardson and Taylor (1982) reduced the statements to 10 in testing whether vivid imagers were better at changing mood than weak imagers. Mood shift with so few statements was successful and vivid imagers were shown to have a greater ability to alter their emotions. It should be pointed out that despite their success, Richardson & Taylor felt that utilising the full set of statement cards was most effective.

Another modification to the VMIP procedure was implemented by Sinclair et al (1994). They provided subjects with what they termed 'an incubation period' directly after the VMIP. During this incubation, written instructions encouraged subjects to build upon their mood, letting it become more intense and letting it grow. The authors reported that this period of reflection was highly successful in inducing mood, shifting affective states for up to 35 minutes.

A paper by Engebretson et al (1999) showed that the VMIP could be used to generate anger. These researchers drafted 72 anger statements that were whittled down to 50, following evaluation from psychologists and psychiatrists. Eight-one college subjects (similar numbers of males and females),

were asked to work their way through the printed anger statements, arranged in a loose leaf binder, prompted by verbal instructions from an experimenter at 20 second intervals. Following a ten minute rest, participants were then inducted into the depression condition. Mood shift was measured on a 'brief version' of Izard's Differential Emotion scale, which combines mood adjectives with analogue scales. The induction proved successful with Engebretson writing: *"The anger induction... exhibited good sensitivity in that it successfully induced moderate to higher levels of anger in over two thirds of the sample. In addition it also exhibited moderately good specificity in that other moods changed minimally during the anger induction, with the exception of happiness which declined significantly."* p21

Mention was made above as to how the VMIP may work (Berkowitz and Troccoli 1986). Fundamentally, it rests upon the same notion of associative firing as discussed in chapter three's experiment. As subjects assert specific mood statements, memory and cognition operate in conjunction to alter the physiological arousal of the percipient into the desired emotional state. Some researchers such as Rholes Riskind and Lane (1987) have questioned whether the self-referential aspect directly fires the activation network or whether there is a cognitive evaluation in between. In their experiment subjects read statements that evoked emotion, (e.g. I am sad), and others that held no overt emotional content, (e.g. I have failed). They found that both approaches were successful in changing mood state, and inferred that these somatic statements had to interpreted by a cognitive component to enable mood change.

Some other points seem worthy of consideration, and one that researchers are agreed upon, is that female participants are more susceptible to the VMIP than males. Various experiments have thus focussed upon using an all female subject pool, Gouaux & Gouaux (1971) 114 female undergraduates, Snyder & White (1982) 177 female undergraduates, Natale & Bolan (1980) 26 female undergraduates, Hale & Strickland (1976) 20 female undergraduates, Coleman (1975) 140 female college students. Indeed the original published study by Velten, which was based upon his doctoral research used an all female subject pool. As yet however, nobody really seems sure as to why men are relatively resistant to the procedure.

Albersnagel (1988) has commented on the idea of self-consciousness during testing, under some protocols where the experimenter is present with the subject (e.g telling them when to move on to the next statement) there may be a reluctance on the part of the subject to get too 'involved' as it may seem embarrassing. Experimenters must therefore decide whether their presence is entirely necessary, whether subjects can proceed at their own pace, and when they cannot - whether automated signalling could be employed.

As with the experiment in the chapter 3, this study aimed to examine how the mood states of anger and elation would effect the operation of an RNG system. The VMIP was chosen for several reasons. Firstly it is historically the most commonly used procedure and (despite the criticisms discussed) is capable of generating powerful affective change. Secondly it is easy to administer. Thirdly boredom can be reduced when subjects complete the procedure at their own rate. Fourthly, people can draw upon powerful *personal* episodes when directed, which as reasoned, are much more salient to the individual than general stimuli. Finally, the VMIP offers various opportunities for novel modifications.

Methodology.

Design

A repeated measures design was envisaged, as generalised anger generation protocols can prove difficult with naïve subjects under artificial circumstances. By reusing the same 'installation' process, it was hoped a practise effect would materialise where subjects could draw on their previous trial experiences and enter target states more easily. A problem with any repeated measures design is the lack of contingency should a subject cease to take part. This may be due to disillusionment, unforeseen personal circumstances or apathy, but the net effect is that the data has been collected in vain. A decision to use subjects personally known to the experimenter was made, in the hope they would prove more committed to the project than openly recruited individuals. In addition using known subjects could reduce potential demand characteristics, as the power imbalance between experimenter and subject could be reduced, trust levels increased, subjects would feel less compunction to try to please the experimenter, and in turn report mood shift honestly. Plenty of effort was made during the pre-experiment briefings to encourage subjects to try really hard in entering the mood states on the cards and to report honestly.

As with any experiment that utilises negative affect, efforts must be made to return the subject to a less unpleasant state and that anger-state precede elation, ensuring no subject left a trial harbouring 'negative' affect.

The mood statements and cards

Since subjects were to complete the experiment 5 times, there was concern that experimental fatigue might set in as the trial number increased; as such a decision to use a small quantity of mood statements was made, leading to the construction of eight anger and eight positive structured statements by the experimenter. (see appendix C) Under normal VMIP methodologies, the mood statements are presented in a consistent plain manner, i.e. text of a fixed font, fixed size and on plainly coloured paper. It was felt that a dynamic approach might produce a more effective mood shift, and much thought was given to the design of the cards. In order to engage the attention of any VMIP reader, the author turned to the literature surrounding the effectiveness of printed hazard warnings. Adams and Edworthy (1995) had investigated how different font sizes and borders affected the perceived urgency on warning labels. It was found that perceived urgency increased as font sizes grew larger and as borders thickened, and that red was distinguished as significantly more alerting than black. Similarly, Braun and Silver (1995) found a continuum of colour corresponding to compliance of hazard, whereby red was most effective and blue least effective. Previously, Young and Wogalter (1990) had found that *conspicuous print* was understood and recalled much better than plain print.

These studies indicate that the use of colour and differing text formats could significantly influence the behaviour of subjects, as such the Velten cards used in this study were designed to make use of the 'benefits' that presentational manipulation affords. Three types of card can be categorised. Firstly each condition (anger, elation) had subjects read what might be termed: a 'mood calming card', such as "I feel relaxed and calm. Nothing is bothering me right now.' These calming cards were printed against green backgrounds in a white font, in a regular size, to convey affective tranquillity.

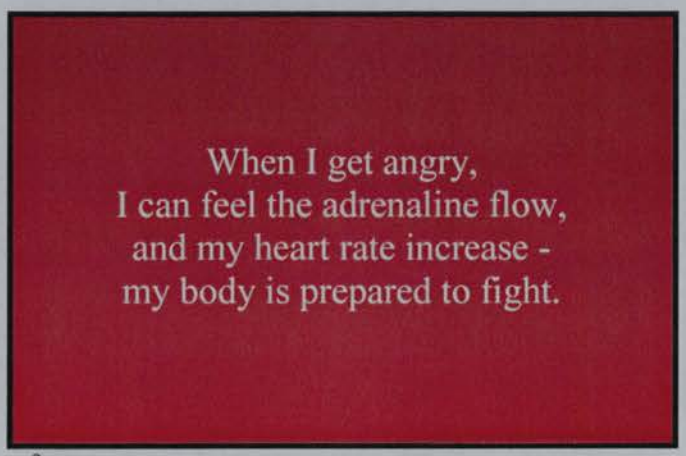
e.g. (elation condition, card number 1)

After reading these relaxation cards, subjects recorded their baseline measures of anger or elation.

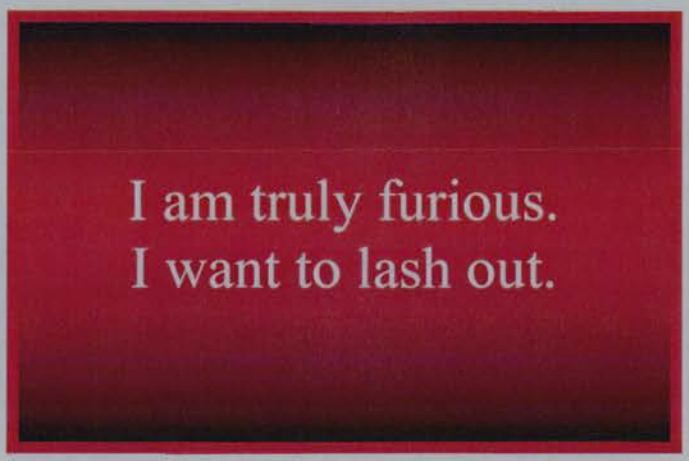
Anger Cards

The anger statements were printed against red backgrounds in a white font. As the subject worked through the pack, the font size increased and lateral black borders grew in size and strength, blending with the red body of the card. This was intended to focus the attention of the subject more and more onto the written message. The statements themselves were created to evoke greater and greater levels of anger, and included reference to physiological feeling.

E.g. Anger condition, cards 3 and 7



3

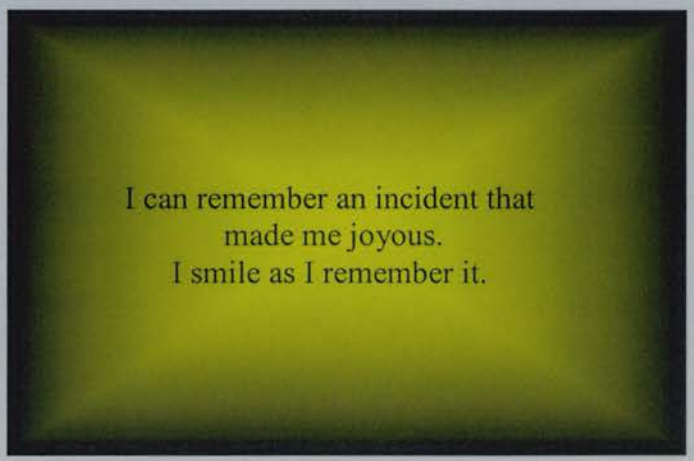


7

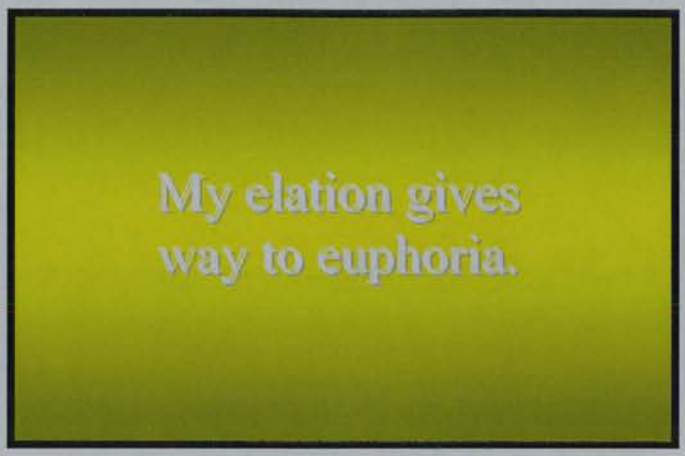
Elation Cards

The elation cards were designed around the analogy of a sunrise. As subjects made their way through the set, the heavy black borders lifted and the black font on the earlier statements changed to white. Once again, the font size increased to signify raised feelings of emotion. Some of the statements had specific reference to physiological change (e.g. card 2), whilst the majority focussed upon the phenomenology of happiness.

E.g. Elation condition, cards 2 and 6



2



6

The printed cards used by the participants were 90 x 60mm in size, printed in high resolution and laminated, to engender a sense of professionalism and overall quality.

The workbook

The workbook previously mentioned, served as an instruction manual and record of mood shift. Instructions when to work through the cards were accompanied by Visual Analogue Scales for participants to record state emotion within, (see Luria 1975 for validity of visual analogue mood scales). VAS were chosen because subjects had to rate their emotion four times over the course of each trial and no other method offered the same speed. Furthermore, other measurement protocols such as the MAACL could have confounded any PK data, as subjects moved from *experiencing* target emotions to *thinking* about them. The bipolar scales were 140mm long and asked participants to mark their mood state in relation to the questions 'how angry/happy are you right now?', ('not at all' on the left-hand extreme to 'very angry/happy' on the right). Empty boxes in the bottom right hand corner of each page were filled in by subjects, with the onscreen cycle number of the RNG, allowing synchronisation between the RNG and progression through the workbook. With both conditions, subjects read and experienced a tranquillity card, then rated their state emotion. Having worked through the remaining cards, they once again estimated their new arousal level. In between the two conditions, participants were explicitly instructed to take a moment and clear their minds.

The RNG

Whilst subjects worked through the mood induction cards, the Orion RNG (as detailed in chapter 2 and used in all experiments) was geared to produce a standard 200 bit/sec binary output. Subjects were shown pre-experiment how to activate and stop the system, so that each trial could be commenced in privacy and when they were ready. No instructions were made towards the subjects to actively influence the RNG and no feedback as to the system's state was provided. The RNG and laptop were placed on the same desk as the workbook, and no more than 3 feet from the subject. Subjects were tested in a fixed location of their choice, typically within their residence. The experimental space was kept constant throughout all trials and to minimise confounds, no other individuals were permitted near the experimental space during testing. Trials were carried out on non-consecutive occasions over several months.

Subjects

6 subjects (4 females and 2 males), ranging in age from 22-27, were personally recruited by the experimenter. The reasons above highlighted the importance of honesty and commitment by the subjects and personal recruitment was considered the most effective way of providing such advantages. Testing took place over 5 months between August and December 2002.

Procedure.

For each initial trial, the subject was comfortably seated and a pre-experimental briefing was carried out. This informed the subject as to the nature of the experiment (affective change), the measuring system (the RNG) and how the self-report scales should be approached. Participants were told that they would be reading self-referential mood statements from cards, and they needed to do their utmost in trying to experience the statement printed on each card. (Larsen & Sinnett's (1991) meta-analysis of the VMIP suggested that the mean effect of the VMIP was much larger when experimenters gave explicit instructions to enter specific mood states). Encouragement was made to use episodes of personal history, to consider themselves actors, to vocalise or create any personally effective strategies. Subjects were told to progress through the workbook and statements at their own speed.

Once this briefing was complete, the experimenter verified the measuring system was operating satisfactorily, via a short practise run, which confirmed the RNG was outputting to the computer. After this, he left the test area and the subjects started and stopped the measuring system themselves. The cessation of sampling was to coincide with completion of the workbook. Once the experimenter left the room, he busied himself elsewhere in an unrelated activity (such as reading), to try and minimise himself as a source of psi. Upon each subsequent trial (experimental session), a shortened briefing was carried out to reacquaint subjects with the purpose of the study and operation of the equipment. At the end of each trial, a quick debriefing was carried out to gauge the VMIPs effectiveness, ensure that the equipment appeared to have operated successfully and to ensure that no negative affect remained.

Formal Hypothesis

State anger periods would prove significantly anomalous in the output of the RNG. (N.B. No direction in shift was predicted.)

Results

Table 5.1 - Results to the mood induction

mood induction - average values								
	pre induction anger level	post induction anger level	shift	shift in standard deviations	pre induction elation level	post induction elation level	shift	shift in standard deviations
subject 1	21.8	117.4	95.6	+3.1	65.8	127.4	61.6	+7.3
subject 2	10.0	86.8	76.8	+9.0	71.5	117.0	45.5	+4.7
subject 3	22.8	76.8	54.0	+4.1	7.8	100.0	92.2	+41.9
subject 4	8.0	108.0	100.0	+26.3	36.8	113.8	77.0	+4.8
subject 5	12.2	89.0	76.8	+6.9	58.4	112.0	53.6	+3.0
subject 6	5.2	88.2	83.0	+20.6	51.0	116.3	65.3	+12.1
overall	13.3	94.4	81.0	+5.3	48.6	114.4	65.9	+3.8

Table 5.1 (above) shows the mean mood scores across subjects for each condition. On three occasions, subjects failed to correctly mark their mood states thus, the degrees of freedom values for the relevant related sample T-tests are less than the expected 30. Results indicate that the mood shifts were successful and significant in the expected directions – Anger increased, $p<0.001$ $t=-15.523$ ($df=28$), Elation increased, $p<0.001$ $t= -13.616$ ($df=27$).

Table 5.2 - Results of RNG activity

Cumulative RNG activity, represented as a terminal stouffer z.						
	start. instructions and neutral mood induction	Anger Induction	Return to neutral mood	Elation Induction	Post induction run-off	Overall subject performance
subject 1	2.721	0.428	0.062	0.736	0.096	1.598
subject 2	-0.622	-1.816	-0.689	-0.157	0.394	-0.923
subject 3	-2.046	0.041	1.209	0.815	-1.719	0.136
subject 4	-0.708	-0.101	2.382	0.851	-0.439	1.189
subject 5	-0.331	0.111	-0.168	0.182	0.845	0.124
subject 6	-0.758	-0.428	1.488	0.361	-1.297	-0.452
overall	-0.933	-0.820	1.783	1.159	-0.611	0.585

Table 5.3 - Results of RNG activity (Chi Square)

RNG activity, represented by Chi Square (p) values						
	start. instructions and neutral mood induction	Anger Induction	Return to neutral mood	Elation Induction	Post induction run-off	Overall subject performance
subject 1	0.004	0.787	0.663	0.735	0.291	0.166
subject 2	0.031	0.195	0.688	0.589	0.206	0.324
subject 3	0.489	0.578	0.120	0.782	0.642	0.416
subject 4	0.816	0.999	0.129	0.507	0.812	0.760
subject 5	0.225	0.496	0.687	0.501	0.900	0.906
subject 6	0.188	0.854	0.330	0.913	0.445	0.786
overall	0.058	0.926	0.355	0.913	0.706	0.696

The results as summarised in Tables 5.2 and 5.3 show, that 'section one' where subjects were required to clear their minds and enter neutral mental states, did not show significant anomaly under Z test or Chi Square analysis. The anger induction section fails to provide any significant deviation, and the mean effect across subjects terminates in stouffer z of –0.82 (p= 0.21), (χ^2 = 18.821, d.f. 29, p=0.926), as such the formal hypothesis cannot be accepted. For section 3, where subjects had to reduce their level of anger, the mean deviation showed strong anomaly (p=0.074, e.s. = 0.038), but not with chi square. Subjects 3, 4 and 6 are mainly responsible for the effect. The elation induction (section 4) shows a trend of positive anomaly represented by the terminal stouffer z of 1.159. Also included is

RNG data (section 5) sampled between the end of inductions and before the measuring system was deactivated. Relatively fewer bits were collected over this section than any other and little in the way of a trend is established.

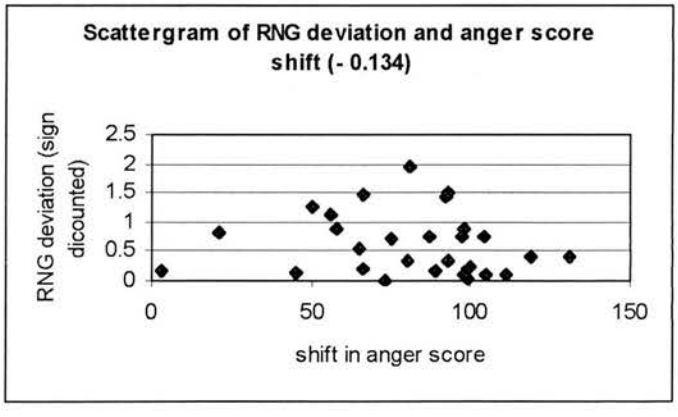
Pre-experiment, it seemed possible that RNG activity could be correlated with mood shift, such that especially large changes in emotion might prompt larger anomalies within the RNG's output. As such, two groups of analysis were carried out. In the first RNG data was correlated against the terminal mood scores for elation and anger. In the second, RNG data was correlated against the size of shift between pre and post induction measurements. Under both analyses, the direction of RNG shift was discounted. The reader should be advised that both datasets were very noisy and that no significant correlations were found (table 5.4). The accompanying scattergram illustrates the 'noise' level within an example dataset.

Table 5.4 – Correlations between RNG and Mood

Correlations between RNG and Mood

	RNG during induction period	
	Spearman	Pearson
pre induction anger level	0.087	0.164
terminal anger score	-0.097	-0.05
anger score shift	-0.244	-0.134
pre induction elation level	-0.073	-0.057
terminal elation score	-0.02	0.078
elation score shift	0.063	0.113

Scattergram 5.1, shift in anger level versus RNG deviation



Post-hoc Analysis

It became clear from conversations with participants that after the first trial, they were aware of the format to the experiment and consequently regarded it as a 'two-parter' (anger then happiness) Therefore it seemed logical to divide each trial into 2 sections, phase 1 which incorporated the initial calming period followed by the anger induction, and phase 2 – which involved the calming period between conditions and the happiness induction. (See table 5.5 below).

Table 5.5 – Data split into two phases

	phase 1		phase 2	
	Stouffer Z	Chi Square (p) value	Stouffer Z	Chi Square (p) value
subject 1	1.630	0.160	0.644	0.875
subject 2	-1.891	0.343	-0.550	0.356
subject 3	-0.843	0.870	1.331	0.288
subject 4	-0.451	0.915	2.166	0.315
subject 5	-0.096	0.967	0.037	0.817
subject 6	-0.737	0.519	1.222	0.443
overall	-1.172	0.862	1.999	0.680

The run-off period post-induction (section 5) was not included as technically it was outside mood change periods. This post-hoc division serves to reinforce and highlight how the two contrasting parts to this study seemed to operate in reverse directions (phase 1 – negative, phase 2 – positive), and were a result of low level cumulative deviations, not 'overt' anomaly. Table 5.5 once again highlights the issue of multiple analysis, as consecutive data segments were combined. The reader should remain aware that the two-part split was made after conducting the final experimental debriefings and before the experimental data had been examined.

The debriefing

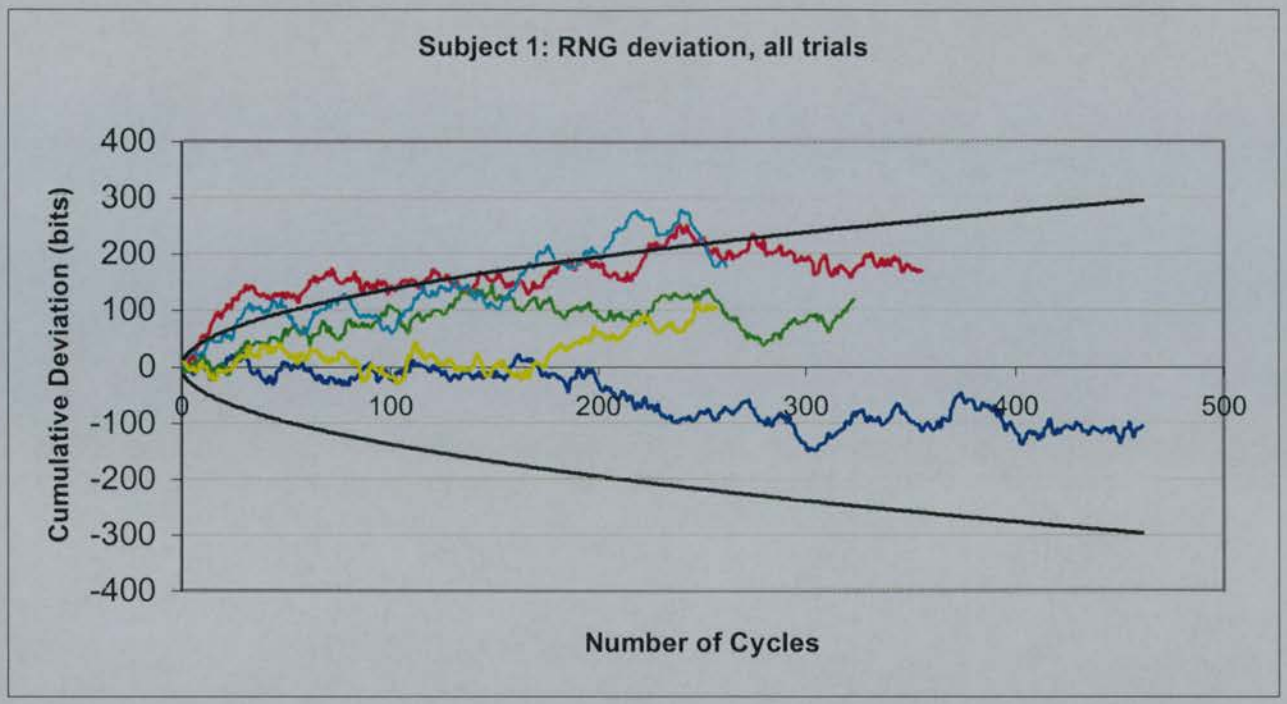
At the end of each subject's fifth and final trial, an extended debriefing was carried out into the experiment as a whole, and these reports provided some interesting findings. Subjects seemed in accord when stating that mood shift became easier as the number of trials increased. Carrying out the first trial smoothly was considered hard, especially when it came to invoking anger. As one of the male participants explained: *"To begin with, it was quite hard to come up with things that made me angry*

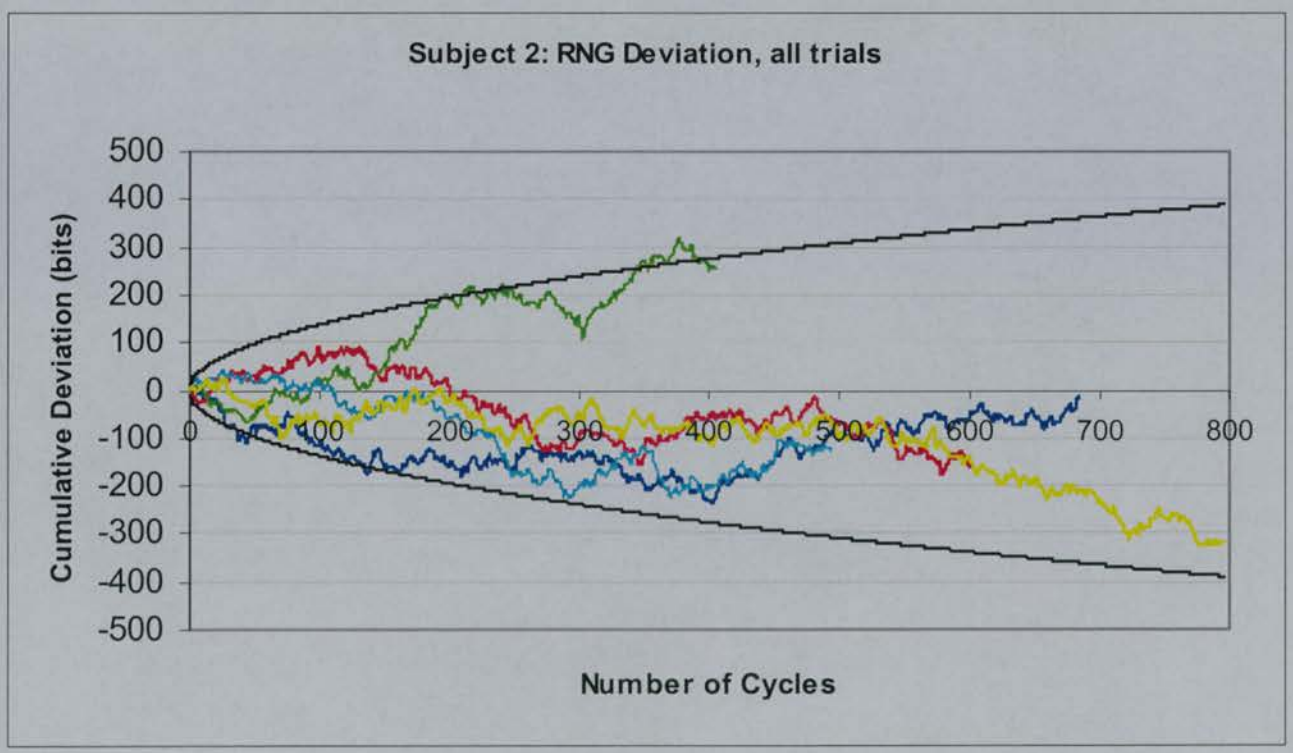
but as I did more trials it became easier... I re-used my previous thoughts." On the other hand, elation was considered much easier to produce. It may be that the recall of distressing, anger-related incidents are naturally difficult because of the tendency to suppress the recall of subjectively distressing thoughts. When subjects were specifically asked what strategies they employed to enter the desired affective states, all replied that they tended to use personal episodes. One female participant responded that: *"I would draw on personal episodes from my past... I would take my personal event and fictionalise it by imagining how the situation could have been even worse or better therefore making me angrier or happier."* In turn, it seems that the induction procedure was capable of producing quite marked shifts in physiology arousal. Subject six reported after one trial how the anger section made him extremely physically agitated, as though sought to act upon the root cause through bodily action.

The question of whether the dynamic nature of presentation was effective was raised and the view overall was that statements presented with colour and varying font size were considered more engaging than the regular form - in black and white, with fixed fonts. When asked, how the colours on the cards effected mood, one subject replied that she saw the cards themselves as mood congruent: *"The colours reflected symbolic qualities of happiness and anger."* she noted. Moreover, the happy cards held: *"warmth, sunshine, bright feelings..."* Thus reports from the participants provide some vindication for trying out novel conventions, although there remains a risk that the positive responses were a result of demand.

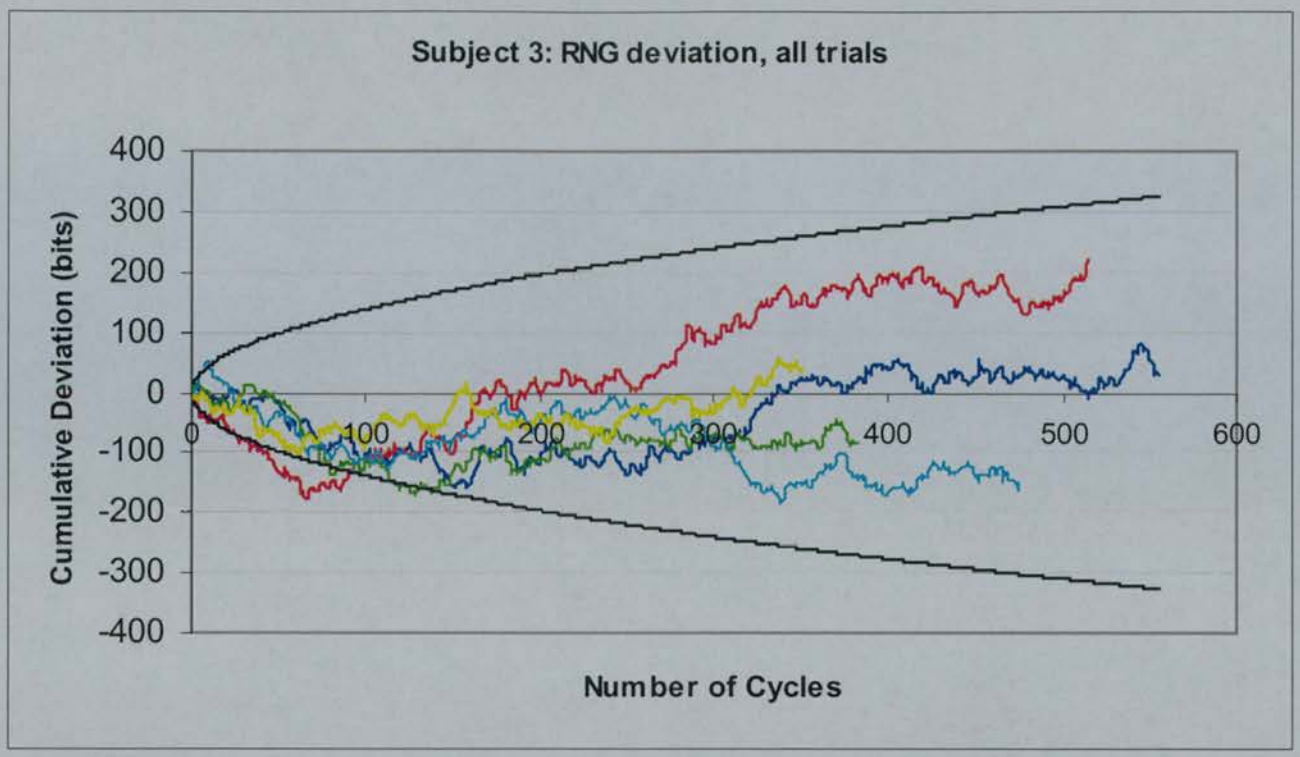
Subject patterns.

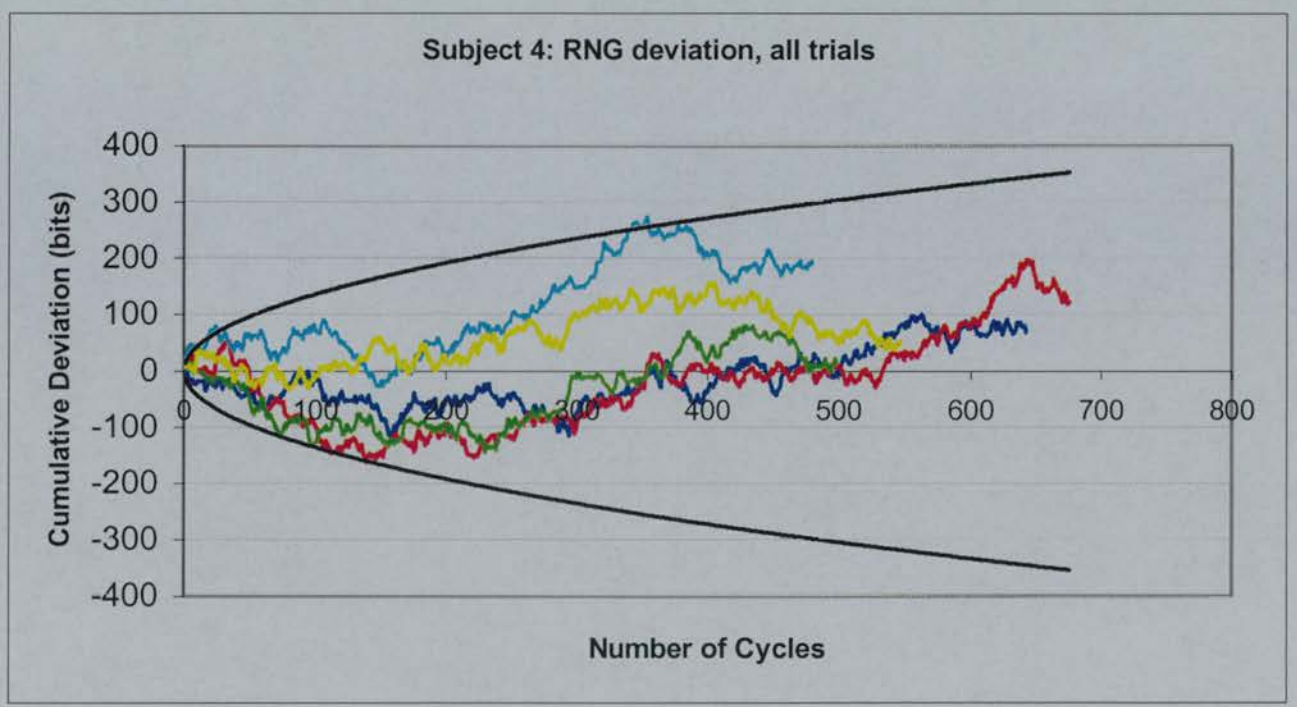
Although primary analysis involved comparing the RNG output against mean chance expectancy, it became clear to the experimenter whilst eyeballing the data that the certain 'individualised' patterns emerged across subjects. See charts (5.1 to 5.6) below.

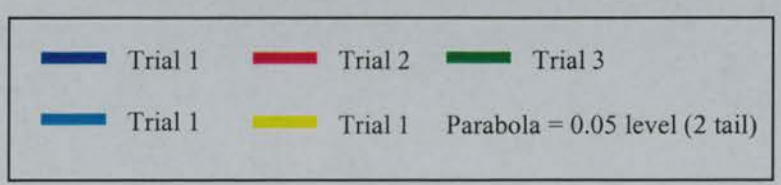

Subject 1: RNG deviation, all trials
Cumulative Deviation (bits)
400
300
200
100
0
-100
-200
-300
-400
0
100
200
300
400
500
Number of Cycles

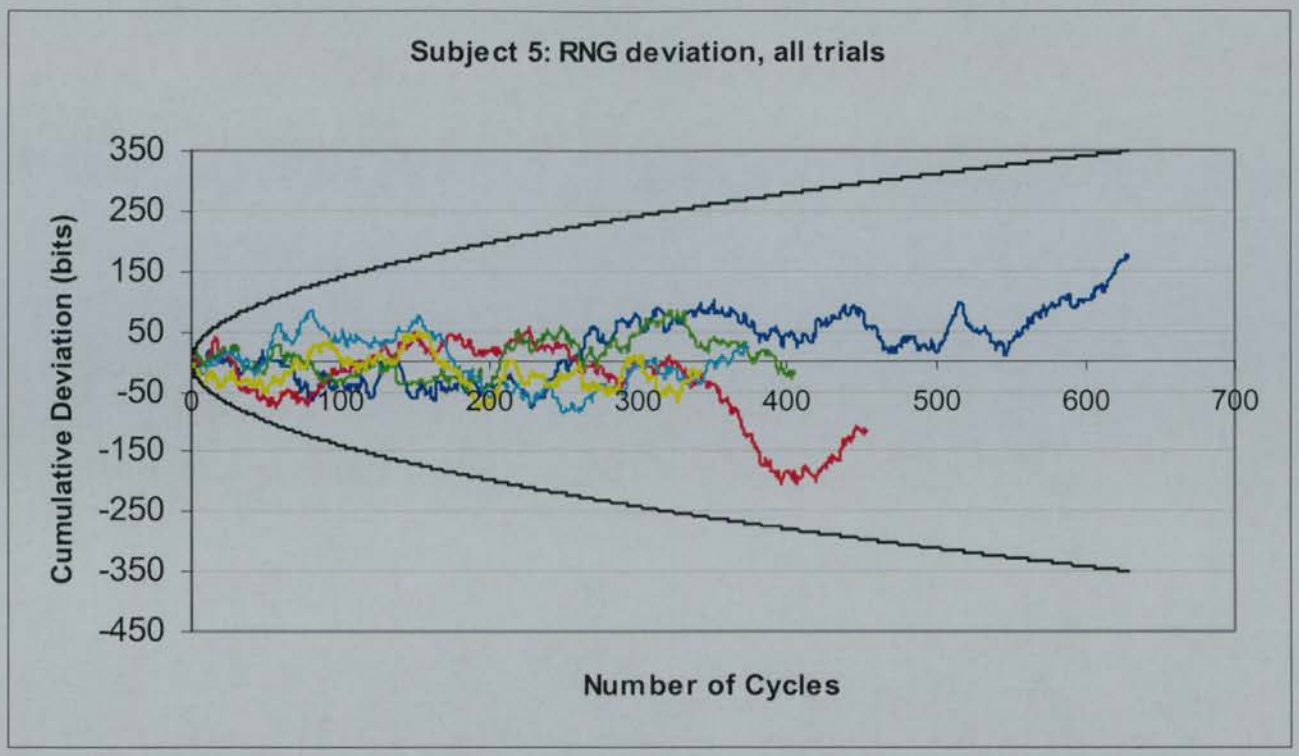

Subject 2: RNG Deviation, all trials
Cumulative Deviation (bits)
500
400
300
200
100
0
-100
-200
-300
-400
-500
0
100
200
300
400
500
600
700
800
Number of Cycles

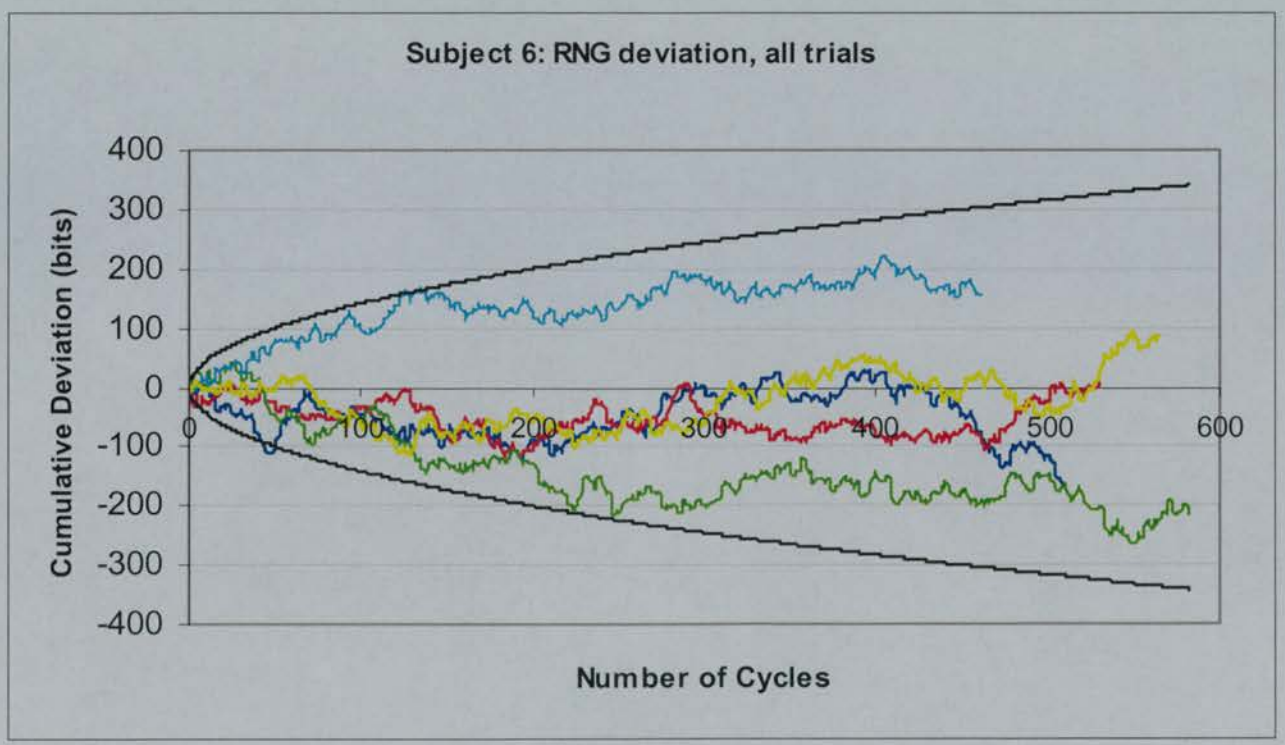

Trial 1
Trial 2
Trial 3
Trial 1
Trial 1
Parabola = 0.05 level (2 tail)

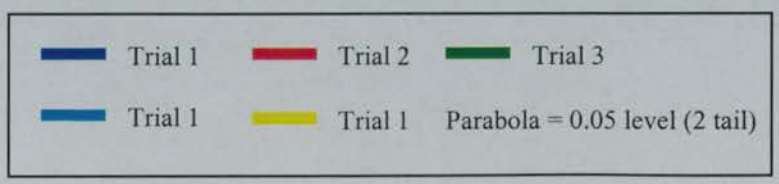

Subject 3: RNG deviation, all trials
Cumulative Deviation (bits)
400
300
200
100
0
-100
-200
-300
-400
0
100
200
300
400
500
600
Number of Cycles


Subject 4: RNG deviation, all trials
Cumulative Deviation (bits)
400
300
200
100
0
-100
-200
-300
-400
0
100
200
300
400
500
600
700
800
Number of Cycles


Trial 1
Trial 2
Trial 3
Trial 1
Trial 1
Parabola = 0.05 level (2 tail)


Subject 5: RNG deviation, all trials
Cumulative Deviation (bits)
350
250
150
50
-50
-150
-250
-350
-450
0
100
200
300
400
500
600
700
Number of Cycles


Subject 6: RNG deviation, all trials
Cumulative Deviation (bits)
400
300
200
100
0
-100
-200
-300
-400
0
100
200
300
400
500
600
Number of Cycles


Trial 1
Trial 2
Trial 3
Trial 1
Trial 1
Parabola = 0.05 level (2 tail)

As can be seen from some of the charts, discernible structures are evident. For example, data from subject 4 seems to follow a general distribution where the RNG output starts out flat or negative, and shifts upwards once 150 cycles is reached. The same sort of effect is visible with data from subject 3, which sees all trials deviate negatively to begin with, after which they (with the exception of trial 4) shift positively.

Data from subject 1 indicates that four out of five trials deviated positively, with trials 2, 3 and 4 shadowing one another quite closely. This shadowing was also evident with results from subject 5, although in this case deviations fell within fairly narrow parameters of +/- 50 bits around chance expectancy. Subject 2 shows negative deviations across all but one trial whilst subject 6 sees the majority of his trials operating beneath chance expectancy.

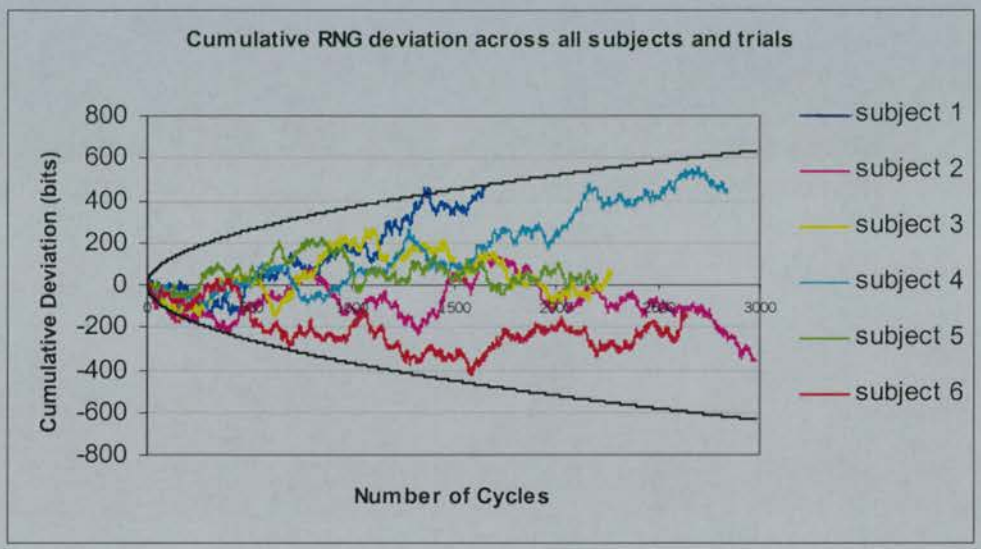
These results might be seen to tentatively suggest that each subject produces idiosyncratic anomalies. These anomalies were evident despite the fact that trials were carried out weeks and even months apart. Rather than focussing upon regular analysis of RNG outputs (Z tests, Chi Square), such data implies that there may be some mileage in analysing outputs for pattern. As mentioned above, subjects reported during the final debriefing that they tended to reuse the same stimuli. Thus one may cautiously suggest that the RNG was in some way allied to the cognitive and perceptual experiences of the participants during their affective transformation. If correct, the RNG could be viewed as analogous to an EEG, picking up specific qualities of mental functioning.

These finding are entirely post-hoc, and should be treated with caution. Although subjects reported using the same mental strategies to enter mood states, there is no way of determining (from the debriefing) which of the five trials used the same mental strategies. As such any substantive analysis of the pattern (e.g. for similarity) at this point might be open to accusations of data mining. Thus it seems sensible to adopt a conservative position, and promote the idea that future experiments look into the anomaly more systematically, before any firmer judgements are made.

Cumulative deviations.

Chart 5.7 shows the cumulative deviation across trials for each subject. Only subject one approached independently significant levels for her 5 trials.

Chart 5.7 – Cumulative deviations for all subjects.



Discussion

Results from this study have shown some important things. Firstly the mood data indicated that this new variation on the VMIP theme, employing colour and 'dynamic' presentation was highly successful in inducing anger and elation, and its success may provide a valuable contribution to mood induction methodology. Positive effects could nonetheless be attributed to various sources, including the practise effect of a repeated measures design, or the heightened motivation of subjects knowing the experimenter.

Secondly, despite question-marks as to the source of any catalysing effect, it would seem that anomaly (in terms of RNG behaviour) originated during the period of anger dissipation. Non-significant trends for the anger and elation induction periods suggest that the mind-matter interaction may be somewhat more complex than originally thought. Even though the effect was not significant, as with chapter three's results, the two main emotions operated in opposing directions. Thirdly, no substantial correlations between the size of emotion and the size of RNG deviation became evident.

Fourthly, some evidence is provided to support the idea that consistent mental strategies for invoking mood correspond with consistent RNG perturbations. This conclusion is post-hoc and should therefore be considered extremely limited, but the charts across trials seem to illustrate distinctive RNG activity, none of which are statistically significant but most of which are 'conspicuous'.

Idiosyncratic signals raise some interesting points. Firstly are the signals meaningful in a particular way? Is there some sort of information within the psi signal? Perhaps RNG anomaly (under unconscious binary protocols) is an epiphenomenon of the real interaction between cognition, emotion and psi? If one envisages PK as a carrier signal that 'transfers' information between two points (akin to an analogue transmission), then can an RNG be manipulated to display a certain pattern, based on the initial signal? One must remember that the RNG has been used in this chapter as an unconscious psi detector. It may be that with volitional studies, signals are teleologically constructed to 'mesh' with the protocols. Consider Morse code. Although it was designed to transmit language, one is able (if required) to create a string of gibberish that produces an excess of dots over dashes. Meaning to the message is usurped by the requirements of the end goal.

The idea that there may be some meaningful (hidden) signals in the RNG output deserves further thought and study. The next chapter illustrates one possible approach in trying to uncover the reality of the psi signal.

Chapter 6 – Text Generating

At the end of the previous chapter, I discussed the notion that PK could serve to convey meaningful information, and that the binary protocols of RNG measurement might obfuscate that information. Thus one might ask, what is actually happening during the interaction between mind and machine, especially when the subject is not instructed to produce anomaly.

Under a volitional protocol, a significant trial implies that the subject was either able to change the RNG's output through causal PK, or use ESP to choose a fortuitous time to observe a trial. Under a passive measuring protocol, where no instructions exist, it is much harder to fathom why an anomaly has taken place. Modern RNGs mostly utilise logic gates (such as an XOR) that invert every other bit, to guard against first order bias. Under this inversion approach, a stream of data such as [111111] is in actual fact derived from the randomness source producing a direct output of [101010] or [010101], patterns that are statistically as likely as [111111]. If the subject's PK interaction was to make the source of randomness (such as the current in the diode) 'noisier', this would not show up in the output. Thus, all that can really be inferred from passive measuring protocols is that an indefinable anomaly has taken place, which only becomes apparent when the data is transformed (e.g. summed) and then compared against chance expectancy. Determining the nature of any interaction become harder still when certain emotions (as per Blasband 2000) seem to have directional properties, anger for example was shown in his experiments to result in the RNG producing an excess of ones (moving in a positive direction), and elation had an excess of zeros (negative direction), yet we are none the wiser as to why. Discussion has been made in previous chapters as to whether the experimenter, although not directly responsible for anomaly, assists in shaping outputs into some goal-state. Thus one might suggest that it was Blasband who interacted in some way with the subject to ensure that the anomaly was directional, and Blasband who sought to derive meaning from the data by fashioning a tangible pattern.

Fotini Pallikari-Viras (e.g. 1993, 1997) has posited that RNGs are subject to statistical balancing. A system might deviate from chance expectancy at some stage, but *will* be balanced by inverse deviation(s) later on, that restore the system to equality. Pallikari-Viras has drawn the analogy of harmonic motion to illustrate how a random system might rebound over time. All that a subject (as a

source of anomaly) can do is skew the output during a particular period. The obvious problem with such a theory is that one needs to define an end point to the system, a point where a decision can be reached as to whether it is balanced. If the system is allowed to sample for an undetermined length of time, then one can never be sure when the rebound will 'have' to occur, and such a position raises interesting questions for 'always on' sampling such as the Global Consciousness Project. If RNG studies are constrained by statistical balancing (which there is little positive support for), then participants may only able to produce short-term effects, that become progressively more constrained as the system becomes subject to counterbalancing later on. One potential way around this problem, which has not been empirically tested, is to test an RNG with a pre-determined life-cycle. Researchers would need to build an RNG from untested component parts, sample it for a certain number of bits such that each and every bit of data is recorded, and then physically destroy it, ensuring there is no opportunity for the RNG to be operated again. Furthermore the RNGs should be tested under the most psi-conducive circumstances in order to promote anomalies. In completing a sequence of such tests, on different RNGs, one can determine whether they maintain system equilibrium over their lifespans.

Looking towards the idiosyncratic patterns in the last chapter, what seemed apparent to me is that were psi to operate in the real world, it may seek to transfer coveted properties onto outside systems that either provide information or influence. Whilst RNGs have traditionally been used to look at influence models, one could argue that we should look at whether there are informational signals in psi/PK. Furthermore we need to shift away from binary measures which are somewhat alien to human processing. People do not perceive in binary terms, cognition and communication systems are complex. Whilst any communication can be distilled into a binary format, it is not a format people are instinctively familiar with. Although one understands how the ones and zeros on a compact disc represent music, the data still needs to be transformed before a perceptual experience can occur.

Thus one might envisage a process where an agent looks to transfer a particular perceptual object (such as a word or image) and influences an RNG to produce a data stream corresponding to that object. Rules can then be invoked to convert the RNG's output into a suitable representation of the object. As such, I looked towards the creation of an experiment that required no form of statistical aberration and one which could present randomly derived data in a comprehensible format – written language. The

next question was how to derive a meaningful set of rules so that information could be (potentially) transferred between mind and machine without violating mean chance expectancy, and without necessitating any rebound effects.

Method

To examine this paradigm, two experimental programs were written. In the first, RNG bytes which had an equal number of ones and zeros (i.e. which were balanced) were assigned to letters from the alphabet. There was an equal chance of generating any letter from the alphabet. As table (6.1) beneath shows, the letter <a> could be derived from byte27 (00011011) or byte29 (00011101). A <space> was assigned to 6 bytes which left twelve redundant.

Table 6.1 (Program 1: characters and their associated bytes)

<space>					
15 23	184 195	197 198			
A	B	C	D	E	F
27 29	30 39	43 45	46 51	53 54	57 58
G	H	I	J	K	L
60 71	75 77	78 83	85 86	89 90	92 99
M	N	O	P	Q	R
101 102	105 106	108 113	114 116	120 135	139 141
S	T	U	V	W	X
142 147	149 150	153 154	156 163	165 166	169 170
Y	Z				
172 177	178 180				

In the second program, the assignment of bytes to letters was based on character frequency (including spaces) in the written English language, derived from the British National Corpus database. As such, the character <a>, occurs roughly 6.5% of the time and therefore roughly 6.5% of the RNG's 255 possible byte states was assigned as an <a>. On occasions where a letter has very infrequent written usage (e.g. <z> 0.2%), the nearest positive number of bytes was assigned (e.g. a single byte - byte255) The <space> was assigned 47 byte states corresponding to its character frequency of 18.5%. For both programs, whenever a <space> was generated, the computer logged this as the start point for a new text string. Table 6.2, beneath shows the allocation pattern for all potential RNG byte states.

Table 6.2 (Program 2: characters and their associated bytes)

<space>					
0-46					
A	B	C	D	E	F
47-63	64-66	67-72	73-80	81-106	107-111
G	H	I	J	K	L
112-115	116-126	127-141	142	143	144-152
M	N	O	P	Q	R
153-157	158-172	173-188	189-192	193	194-206
S	T	U	V	W	X
207-219	220-238	239-244	245-246	247-250	251
Y	Z				
252-254	255				

Thus when running these programs, a string of text would be produced (e.g. Program 2: *wostindll m lne tdentynm os ta cxng ta u ostdln gcfxeshirt aeyihch s gpives*) that was stored in a time-stamped, separate data file. Both programs were written to give the option of real time feedback to the participant. However during testing it became apparent that the speed of character generation made word perception and comprehension difficult. Since the programs were conceived under passive measuring protocols, it was decided to provide no real time feedback.

Obviously both programs were capable of generating very large and noisy datasets. A sifting program was thus written where the text strings were sorted, and any that were either very short (less than 3 characters) or very long (more than 12) were deleted. This was to prevent the system being flooded with a morass of one and two letter words, as well as improbable multi-letter sequences. The risk that meaningful words would be deleted was a concern, but it was felt that two letter words were less conducive to meaningful information transfer, that there are relatively few words of more than twelve letters, and the processing strain on the system had to be reduced. The remaining text strings were then analysed by a dictionary-matching program (kindly written by Alan Marshall, 2001) which placed recognised words into a final data file. Thus both programs ultimately generated a list of genuine words, recorded to file in chronological order.

Program 1 was written so that no deviation from chance expectancy had to take place to create words; no letter was more likely than another and each letter derived from a balanced byte of data. By using balanced bytes, the generation of letters should have no impact on the overall randomness of the system

as they neither increase nor decrease the overall system state. Program 2 also permitted balancing but in a different way. Consider the letter <p>, this can be produced using bytes 189, 190, 191 & 192, and their binary values of 10111101, 10111110, 10111111, 11000000. If the system output was producing an abundance of zeros, and was therefore 'required' to produce more ones to rebalance, the letter <p> can be selected with byte 191 (7 ones, 1 zero). If there were too many ones, byte 192 (2 ones, 6 zeros) could be utilised instead.

The production of <spaces> were inherently biased towards greater numbers of zero bits, but this could be countered by the selection of letters with greater ones. In addition the system can balance with 'gobbledegook' strings. Should the system be generating too many zeros, a short string of (for example) 'znu' would produce 21 positive bits out of 24; too many zeros in the system could be counteracted by selected letters (e.g. byte127 <i>) or more <spaces>. The fundamental point is that numbers of meaningful words can exist within the output as a whole, and due to the in-built redundancies there is no requirement for the output having to deviate significantly from chance expectancy.

Results from exploratory trials.

There are two primary ways of analysing data from these programs. The first is to look at the hit rate of valid words produced against non-valid words. This rate can then be compared across conditions. The second is to look at the meaning of the words and determine whether they have any pertinence to the conditions or stimuli. When the programs were devised, this second method was to be the primary means of analysis. Under formal testing conditions, a judging panel would have to be employed to decide whether the words had any real value, however for these informal trials, the experimenter acted as arbiter.

Rate of word generation

In the first group of tests, the author acted as sole subject, and looked at the effects of wilful intention (trying to generate words) and non-intention upon RNG outputs. Three conditions were employed. In the first (the active condition) the experimenter engaged a relaxed and non-striving volitional style, with the goal of creating an abundance of words. In the second condition (passive) the experimenter

remained proximally placed to the measuring system but made no effort to interact with it. A no subject condition provided a baseline.

Since program 1 was arranged with an equal likelihood of any letter being produced, a low hit rate (between 0.58% and 0.73%) emerged. See table 6.3, below. Anova analysis revealed no significant differences between groups.

Table 6.3, Results from exploratory trials into Program 1

Condition	Trials	Number of letter strings created per trial	Average Number of 3-12 letter words created	Average number of words created per trial (total/10)	Valid words as a percentage hit rate
Operator Present - intention	10	2000	941	6.6	0.70%
Operator Present - no intention	10	2000	933	5.4	0.58%
Operator not Present	10	2000	953	7.0	0.73%

Program 2 was designed to generate quantitatively greater numbers of words and produced a hit rate of around 2.3% across each of the mentioned conditions. See table 6.4. Once again there were no significant intergroup differences.

Table 6.4, results from exploratory trials with program 2

Condition	Trials	Number of letter strings created per trial	Average Number of 3-12 letter words created per trial	Average number of words created per trial (total/10)	Valid words as a percentage hit rate
Operator Present - intention	10	6000	2833	66.9	2.36%
Operator Present - no intention	10	6000	2854	67.6	2.37%
Operator not Present	10	6000	2841	66.3	2.33%

Word Probabilities

There is obvious sense in determining the statistical likelihood of a word's occurrence, for instance 'buzz' is far less likely to be generated than 'feel'. It may be that under certain conditions, statistically more or less likely words will be generated. At the time of testing above, circumstances did not enable such analysis to be incorporated into the standard program, but this may be one future direction of interest.

Congruency of word generation

One sequence of trials was specifically carried out to look at whether emotionally interesting images might facilitate congruent words. Ten photos were pre-selected by the author on the basis of how personally evocative their content was. They included the images of a striking snake, a burns victim, and a circling shark. The author, who made an effort to remain in a relaxed mental state, looked at each photo for one minute whilst attempting to mentally influence the RNG to generate image congruent words.

Example: trial 2 – stimulus

From trial 2, 80 valid words were generated, including (in no particular order): *sob*, *fuss*, *reacts*, *sot(s)* (three times), *hog, sway, wen* (twice), *magi* and *rum*. Across all 10 trials an average of 76.1 words were generated (range 65 – 92).

Pre-experiment, the intention had been to run all valid words through the MRC psycholinguistic database examining the familiarity, concreteness and imageability of the words produced. However it became apparent that the database was not complete enough to score each and every word and the approach was subsequently dropped. Because the experimenter acted as judge and jury, accusations of data mining might be warranted, and the author would make no claims as to whether truly congruent words were generated. Nonetheless, in my *opinion*, the results did provide a level of support for pursuing this approach further. As such, program 2 was integrated into the standard RNG test program for two later formal studies, the results to which are discussed in the relevant chapters. By changing the program, one ran the risk of confounding the sampling process, such that both approaches constrained each other, but alternatively one could suggest, that the implementation of another means of measuring PK simply opens up a greater opportunity to examine psi anomalies.

As touched upon in the introductory chapter, there is only a handful of laboratory research that has looked specifically into whether negative emotion (in terms of state-unhappiness) modifies PK functioning. Mention was made of Feather and Rhine's (1969) study that witnessed a reduction in PK scoring on a dice task when the daughter member of a mother-child pair was in a negative mood. A study by Andre Eve in 1972 was also cited but which failed to find evidence for any link between mood and the functioning of an RNG. The overall paucity of research could be attributed to the long-held belief in parapsychology that negative affect inhibits psi functioning, and the fact that psi inhibition (although a potentially *active* process) should make any data-set look random. Alternatively, researchers may hold an antipathy towards the induction of negative moods for ethical purposes.

Although earlier experimental chapters have looked specifically at how anger might mediate mind-matter interactions, there is some logic in considering whether (non-clinical) depressed states could facilitate psi, especially if one adheres to the argument that unconscious PK is a function of the need to reduce unpleasant mental states (e.g. RSPK theory). One of the most popular means of generating depressed states within the laboratory has been through the MMIP (Musical Mood Induction Procedure) which revolves around the concept that certain music pieces, with their associated structures of tempo and rhythm can be played to an individual and reliably induce sadness.

Intuitively, most people realise that music can entertain emotional change. It would seem that the ability to perceive certain aspects of music such as rhythm are available from a very early age (e.g. Trevarthen 1999), and adds credence to the idea that music 'processing' may be at least partially innate. Later in life, research has shown how music can become a potent mood manipulator, used to modify energy levels and reduce disagreeable affect. Writing in Musicae Scientiae, Daniel Västfjäll (2001) noted how: *"Recent research indeed shows that there are structural properties that cause the listener to perceive certain emotional expressions in the music"*, p175.

Why music evolved in the first place has sparked a variety of theories; for as Pinker (1997) revealed – music is viewed by many, as apparently 'useless'. Kogan (1997) has suggested that music is not

useless, but developed to boost group cohesion as a communal activity (sitting together and listening). Kogan has also suggested that the process of group listening, aside from generating bonds, lessens any opportunity for conflict to arise because of its distracting qualities. Sperber (1996) meanwhile, has posited that music stemmed from the pre-vocal days of human evolution when less cohesive 'sounds' were the means of auditory communication. Attending to these sounds afforded the listener pleasure and provided a basic means of expression. Music is just an extension of that process. On the other hand, Steve Pinker has preferred to envisage music as a function of other cognitive faculties including emotion, motor control and scene analysis (listening to the environment). These adaptive faculties are naturally combined to operate together, picking out (and therefore able to create) rhythm, pitch, and melody. Music should thus be considered a by-product of evolution. A by-product that affords no adaptive value, but gives the listener pleasure. Conversely Geoffrey Miller (2002) has applied a sexual selection perspective to music, espousing the idea that it developed as a means of attracting a mate. If a musician plays a piece that emotionally manipulates a listener, it is indicative of ability, creativity and intelligence – factors that are attractive to a potential mate.

Away from the theoretical debate as to why music evolved, the fact that it can shape emotional states is of use to the researcher. The MMIP was first employed by Sutherland, Newman & Rachman (1982) who used it in comparison with a reduced (30 statement) Velten procedure (see chapter 5). Depression and elation (typically considered polar opposites of one variable) were invoked under a VMIP protocol with subjects who suffered from 'unwanted thoughts'. The authors expressed a dissatisfaction with the wastefulness of the VMIP, which only worked in around half their subjects, and opted to develop their own alternative means of generating positive and negative mood, namely via music. Thus, in a subsequent part to their study, subjects were invited to choose from a selection of music pieces that they (the subjects) felt sure would help induce depression and elation. Under experimental conditions, subjects were instructed to make themselves happy or sad (through the ideation of happy/sad thoughts, especially those that had personal salience), during which the pre-selected music pieces were played. Successful mood shift led Sutherland et al to conclude that the MMIP in combination with the VMIP produced more substantial emotional change for longer periods, especially in generating depression.

The question of whether the MMIP is as effective as the VMIP was addressed by Albersnagel (1988) who interestingly failed to discern any significant differences between methodologies. In turn, Slyker and McNally (1991) looked at whether the MMIP was more effective than the VMIP in inducing anxiety and depression. Four conditions were employed, instructions alone, the MMIP and instructions, the VMIP and instructions, or instructions followed by both the VMIP and MMIP. 60 students were tested and paid $5 for their participation. Slyker and McNally tested mood change using the self-report measures of VAS and MAACL, and behavioural measures of psychomotor speed and immediate auditory memory. From the subjects who engaged emotional change, there were no real differences in dependent measures between conditions, implying there was no real difference in induction effectiveness across the VMIP and MMIP. Indeed the authors wrote that: *"Instructions to achieve a target mood evidently prompt idiosyncratic strategies that are not necessarily potentiated by the addition of the VIP or the MIP."* p41.

Since its first use in 1982, the MMIP has gone on to become a popular means of emotional manipulation, although it has largely remained a method of inducing depression or elation. Other emotions, such as guilt or surprise, are much harder to associate with specific pieces of music, especially in the absence of explicit instructions. Few experiments have followed the decision Sutherland et al. made which allowed participants to choose their own music, normally a single piece is chosen by the experimenters and applied across the subject pool.

Some efforts have been made to determine what structural components of music facilitate emotion. Table 7.1 is assembled from Bruner (1990) and details some of the main findings.

Table 7.1 – Components to emotional music (adapted from Bruner, 1990)

Component	Emotion	
	sadness	happiness
Mode	minor	major
Tempo	slow	fast
Pitch	low	high
Rhythm	firm	flowing
Harmony	dissonant	consonant
Volume	soft	medium

As can be seen, sadness and happiness tend to occupy opposite positions such that sadness can be characterised as minor, slow, dissonant and low pitched whilst happiness can be seen as major, fast, consonant and high pitched.

(A pitch combination that does not fit into an experientially accepted pattern of harmony is referred to as disonant, whilst consonant refers to a pleasurable experiential feeling). Harmony was the independent variable in a study by Blood, Zatorre, Bermudez, & Evans in 1999. Blood et al. sought to examine how pleasurable and unpleasurable reactions to music influenced cerebral blood flow, measured on a PET scanner, flagging which neural areas were active during perception. A specially written piece was commissioned and the harmony varied, to increase dissonance and consonance. In turn a control condition used 'acoustically matched noise stimuli'. As the authors make clear: *"..the findings in this study identify activity in paralimbic and neocortical regions correlated with degree of musical dissonance, and thus begin to characterise the neural basis for emotional responses to music* [and] *...also demonstrate dissociations from other important cognitive processes."* p386. These dissociations and the idea that music can operate at a sensory level without active cognitive evaluation has also found support from Bruner who wrote: *"Music's role is likely to be greatest under conditions of high affective involvement and low cognitive involvement."* p100. In other words, situations where the percipient is engaged in experiencing and *feeling* the emotion are likely to have a greater impact than scenarios where the percipient actively cogitates the music. Cognition can be viewed as inhibitory.

As well as the manipulation of harmony, other research has shown how musical structure can influence behaviour. Milliman (1982) altered the tempo of music played to shoppers within a supermarket, and found that slow music (72 beats per minute) caused people to progress within the store more slowly, than when faster music (94 b.p.m.) was played. Later Milliman (1986), carried out a similar experiment with diners in a restaurant and found how music could be used to effect the length of time people took to complete their meals, what they chose to eat and the service time.

Two distinct MMIPs can be differentiated - those that provide explicit instructions (e.g. *"listen to the music and use it to help you become sad")* and those that provide no instructions (*"Listen to the music"*). The use of explicit instructions is widespread (e.g. Clark 1983, Albersnagel 1988, and Eich & Metcalfe, 1989), although subjects are typically left to come up with their own salient strategies. Without explicit instructions, the MMIP is considered sensory rather than cognitive, and is therefore considered to promote lesser demand effects. Some researchers such as Pignatiello, Camp & Rasar (1986) have shown that a lack of explicit instructions can facilitate mood change as satisfactorily as

those with instructions. In their study, two groups of subjects with 30 and 50 individuals respectively, were tested on three 20-minute tapes, which corresponded to elated, neutral and depressed conditions. The authors had reduced an initial pool of 45 non-lyrical music pieces varying in length between 1 and 5 minutes to 19 through a selection process overseen by music therapists. The taped inductions therefore were an amalgamation of pieces, edited together such that each tape began with neutral music and became steadily more elating or depressing, (or remained neutral). Subjects were not informed as to the purpose of the procedure, yet when mood shift was measured on the DACL, significant effects were achieved across groups. Pignatiello et al subsequently inferred that *"...the effect was achieved with less demand characteristics because the subjects were not told of the intent of the music."* p296

The question of whether instructions are necessary has somewhat dogged MMIP research. Pamela Kenealy (1988) addressed this issue when testing 35 university undergraduates. Participants were randomly assigned to one of a variety of conditions which included musically induced elation and depression (although her write up fails to mention which pieces were used). Kenealy also employed some counter-demand conditions (i.e. condition where subjects were told that (elating) music tended to put people into negative moods). Manipulations were tested on six dependent measures including a self report VAS, MAACL and behavioural measures such as writing speed and decision time. Post induction, similarly significant effects were found on self report and behavioural measures across regular conditions, whilst the counter demand groups failed to show subjects reporting elation under depression conditions, or vice versa, giving rise to *"confidence that, whether instructions are needed or not, it is not simply the instructions which are causing subjects to adopt mood congruent behaviours when they may not be feeling the mood at all" p47* . Kenealy concluded that the MMIP in itself and without experimental instructions was suitably effective and that the procedure did not suffer badly from demand effects.

Lenton & Martin (1991) also queried how much of the mood induction in the MMIP could be attributed to the music and how much to any overt instruction, and in doing so employed a cunning methodology. Under a regular MMIP protocol subjects were told to enter a particular mood state whilst listening to music, and this resulted in 75% of subjects shifting significantly on a sadness VAS. However, the second condition saw subjects take part in a MMIP that incorporated what participants

believed was 'subliminal' music. In reality, no music was played, yet 87.5% of subjects shifted mood significantly. It would seem that the expectation of mood shift, combined with demand effects prompted self reported changes to affect. As the authors concluded: *"The musical mood induction procedure seems somewhat less musical than the name implies... The results suggest that in the absence of music, the standard instructions were both necessary and sufficient to produce a change on dependent measures."* Such a view had also been put forward by Clarke (1983) who suggested *"... it is unlikely that the* [musical induction procedure] *will have a marked effect on mood unless subjects are instructed to work at getting into the desired mood."* p46.

The problem of demand, as with all mood inductions is not easy to overcome, however one clever means of doing so, was made by Eich & Metcalfe in 1989. In their experiment, subjects had to rate their mood states every 5 minutes in an ongoing open-ended experiment. Once their moods reached a constant but undisclosed and predetermined level, the experiment was stopped. By avoiding a fixed length experiment, the insinuation was that 'fakers' would struggle to maintain progressively higher emotional levels, and that the dependent measures would prove accurate.

The reviews and meta-analyses of mood induction literature offer an overview into the MMIP's overall effectiveness. Maryanne Martin's (1990) review provided figures showing that it was effective for 58% of subjects in the depression condition, 34% for elation and 36% for anxiety, although these figures may be confounded as researchers *"... lack ...a single generally adopted measure of mood and mood change."* p675. The meta analysis of Westermann et al (1996) ranked the MMIP with instructions (in terms of the size of mood change) as the seventh most effective MMIP (out of eleven), and the second least effective procedure after Facial Expressions, when instructions were not provided. The Gerrards-Hesse et al (1994) meta-analysis provided support for Martin's figures, stating that the MMIP without instructions was 58% effective for both elation and depression conditions in themselves. When an intergroup comparison (subject's elation score versus depression score) was made, effectiveness leapt to 95%, and the overall figure averaged out at 75%. For MMIPs that used instructions, they found that twelve out of twelve studies produced significant mood differences between depression and elation conditions. The induction of elation compared to baseline was only successful 25% of the time,

whereas depression was effective 88% of the time. When these figures are combined, the overall effectiveness for the MMIP plus instructions weighs in at 89%.

Thus these reviews indicate, that if you were to employ a music procedure, the use of clear-cut instructions should significantly boost any affective change. Whether this is a demand effect or simply a means of focussing the attention of the subject is open to debate. However one must query why researchers such as Kenealy have not found a lack of instructions to be less effective, when the general consensus is that they are. One explanation may be that certain pieces of music are so evocative that instructions are never needed, or alternatively that the interaction between subject and experimenter establishes much of the outcome. Efforts must be made therefore, to generate trust and honest reporting. Researchers do seem happier to agree that the MMIP does not suffer from the sex bias seen in the Velten, where men are less susceptible to influence than women. Pignatiello et al (1986) for example confirm that the MMIP can be applied readily to both sexes.

Västfjäll's synopsis into which music pieces have been employed in MIPs looked at 41 studies, and indicated that the majority of pieces were of classical origin. They have regularly included pieces by Mozart, Beethoven and Tchaikovsky. It also appears that some specific scores have enjoyed popular use, including *Delibes' 'Coppelia'* to induce positive mood and *Profokiev's 'Russia under the Mongolian Yoke'* played at half speed to induce negative affect, (e.g. Mathews & Bradley, 1983, Clark & Teasdale, 1985, Mayer et al, 1990). This constancy stems primarily from the fact that mood inductions are not the principal aim of the experiment, rather they provide an experimental manipulation for investigating some additional variable. As such, researchers have appeared contented to replicate the protocols of previous studies that reported positive results. Perhaps this is one reason why success rates vary? Methodological replications without the full understanding of the inherent issues might propagate experimental imprecision.

Although contemporary artists including The Beatles, Mariah Carey and the theme from Rocky, have also been used, the relative lack of modern music may be due to the fact that (with the exception of electronica) they nearly all contain lyrical content and non-lyrical music is more generalisable and less susceptible to linguistic confounds. A study by Stratton & Zalanowski (1994) presented music with and

without its depressing lyrics. The music alone increased positive affect, whilst the full piece (music & lyrics) increased depression. Thus music containing mood specific lyrics should be seen as viable means of changing affect, but only when the lyrics are decidedly unambiguous. The more ambiguous, the less control there is over the manipulation.

One must also consider whether one piece of music can be universally applied across subjects. Gabrielsson (2001), has written about music being an individualised process, implying that individually pertinent selections may be more effective. As seen above, Sutherland et al (1982) allowed subjects to pre-select their preferred music pieces, and in a similar vein, Carter et al (1995) got subjects to *bring* their own music to the experiment. Although affective intensity was increased, questions must be raised as to whether subjects genuinely experienced mood change or whether subjects were especially liable to demand effects. Presumably, an individual would feel foolish if asked to bring in the piece of music that made him feel happy, and then reported that in actual fact, no mood shift had occurred.

Some more general issues need to be considered before an MMIP can be carried out. Firstly – how much familiarity should a subject have with the music stimulus. If a piece of music (for whatever reason) is well known to a participant, associated memories and feelings might be invoked during the induction process, counter to any target mood. There is the risk that these pieces may hold individualised meaning for a subject (e.g. heard it at the funeral of a loved one, played it in a concert). In addition some pieces of music seem etched into popular consciousness, such as the themes from the films Jaws and The Exorcist. Likewise music such as Carl Orff's *Carmina Burana* are seen by some to hold certain quasi-religious connotations and unwitting researchers might overlook their impact upon the percipient. As long as the experimenter is aware of the baggage associated with some music, they can be utilised in specific inductions, and might be useful in counter-demand trials. Also, care needs to be taken by the experimenter in ensuring that should any pieces prove confounding, they are unearthed during the debriefing. If a subject was to report that a music piece carried specific and personal negative connotations, the experimenter should preclude their data. With these issues in mind and taking into consideration the likely age group of the subject pool, a decision was made in this study to employ classical pieces, as they should prove less familiar, are lyric free, and therefore less prone to confound.

Enjoyment is one factor that should also be considered. A musical piece may hold all the parts that appear to induce elation, but if the piece is boring or disliked, mood change is unlikely. Finally, pre-experiment mood needs to be considered. A subject entering the laboratory in an especially negative mood might struggle to shift into a positive mood. Although any failure to change mood should be picked up by the manipulation check (and therefore the data would be discarded), for the sake of economy and cost, the experimenter should seek to informally gauge during the pre-experiment briefing, the affective state of subjects.

Thus, thought has been turned towards the idea that RNG anomaly might be associated more with sadness than the specific negative states of anger. Then again, perhaps it is the act of changing of emotion (moving from one state to another) that underpins PK functioning? The MMIP offers a means of producing effective and replicable emotional change and may help facilitate anomalous activity in an RNG.

Method.

Participants.

Current students and alumni of Edinburgh University were recruited through personal approaches from the experimenter and word of mouth recruitment. 15 female and 7 male participants took part in the formal study and were informed during recruitment that they would be required to think of congruent emotional episodes whilst listening to music. These episodes would be used to generate happy and sad mood states and as such, rehearsal should be carried out beforehand. Testing took place during the last two months of 2002.

Location

To boost recruitment, subjects were invited to be tested at the location of their choice, although some 70% chose to be tested within the psychology department. At each location the subject was physically secluded and the experimenter was not present during the trial. During each trial, only the experimenter and participant were privy to the experiment.

Procedure.

Having been welcomed to the experiment and seated comfortably, each subject was informed that they were taking part in a study that looked into mood change, and they would be required to internally generate the emotions of sadness and happiness, whilst aided by musical tracks. The participant's attention was then directed towards the laptop and measuring system, placed close by, and a short explanation of their parapsychological function made. No direct instructions were made for participants to attend to it, simply to concentrate on the operational tasks in hand. Subjects were shown how to stop the sampling program, then advised that all specific induction instructions and the music were contained on an audio-tape. Subjects were also familiarised with the mood recording sheet upon which they were to mark their state emotion.

Subjects were then informed that lengthy mood inductions had been disregarded during the design phase, to ensure that subjects did not lose interest, motivation or focus, and that the music pieces only lasted some 3 minutes each. One other reason for 'short' induction periods stemmed from a realisation that apprehension might be generated during lengthy inductions as subjects struggled to complete an overly long task, confounding mood state and the RNG sample.

Similarly, unwanted mood effects might appear should subjects try to invoke a mood state and fail to do so. Therefore, to minimise this problem, participants were advised that the experiment did not necessarily seek to make wholesale changes in affect, rather it was about doing one's best. Any perceived failure to carry out the task was 'not a problem', and that participants should honestly report minimal mood changes.

Once the experimenter was satisfied the subject understood the protocol and was ready to proceed, he gave instruction to put on a pair of headphones which were connected to a portable tape player. The player was then started and synchronised by the experimenter to the RNG via 3 audible signals. In deference to other data from Bruner (detailed above), the volume was set at a medium level. The experimenter then left the test area and engaged in a distracting unrelated task.

The Stimuli

The audio-tape referred to, was a ten and a half minute custom edited combination of explicit instructions and mood congruent music, the transcript of which is contained in appendix D. Spoken instructions were delivered by the experimenter in a flat emotionally neutral tone. To start proceedings, subjects were reminded of the need to generate sadness and happiness and advised to use whatever strategy they deemed most suitable: *"Perhaps you could remember a life experience, that affected you particularly strongly; or recall an especially powerful scene from a film."* To assist in shifting emotion, participants were told that two music pieces had been chosen.

Subjects were given around 30 seconds to consider which strategies to employ, before being overtly instructed to clear their minds of any current mood: *"Close your eyes, take some deep breaths, and relax... Try to become emotionally neutral."* After some 30 seconds, subjects were referred to the recording sheet in front of them and asked to complete section 1, which asked them to *"Mark on the line below how sad you feel right now."* The measure was a typical bipolar visual analogue scale, 140mm in length with the left hand pole labelled as 'not at all' and the right hand as 'very sad'.

Shortly thereafter, participants were instructed to *"experience the emotion of sadness"* accompanied by *"The Swan of Tuonela", Op. 22 No. 3, by Sibelius.* This piece had been successfully used on previous occasions by several researchers including Albersnagel (1988). The full length music piece was edited to just incorporate the opening three minutes, before fading to silence. Directly after the music stopped, subjects recorded their post-induction level of sadness on a second VAS.

Data from the previous experiments in this thesis appear to suggest that the shift from one mood state into an affectively neutral one might facilitate anomalous RNG activity. Thus, it was felt that a distinct stage of relaxation should be incorporated where participants were allowed a lengthier period of emotional recovery. In turn, to aid this relaxation, the use of audio stimuli was deemed useful. Two means were initially considered. Firstly to provide soothing graded verbal instructions from the experimenter. Secondly to provide calming music or sounds. The literature shows how the invocation of 'neutral' periods has commonly utilised classical pieces of music e.g. Holst (McFarland 1984), Debussy (Parrott, 1991). There are few examples from what might be termed 'natural sources', and

Västfjäll cites Rogowski's (1991) use of bird and insect songs. Ultimately the protocol in this study evolved into using naturalistic active sounds that sought to provide aural analogies with the reduction of emotion. Informal piloting initially looked into using the sound of breaking ocean waves, but in the end, a recording of a 'babbling brook' was employed with its associated connotations of nature, tranquillity, and cleansing. In fact the sound of running water was considered especially fruitful as it implicitly suggested the washing away of any negative affect. In whole, this period lasted close to one and a half minutes.

After this neutral period subjects were asked to rate *"how happy you feel right now"*, and as per the negative induction, the scale was marked 'not at all' on the left hand pole and 'very happy' on the right hand one. Once instructed to begin their elation induction, subjects were played *Eine Kleine Nachtmusik, K525, Allegro by Mozart*, once again a piece used in previous research (e.g Eich & Metcalfe 1989) and found to be highly arousing and effective. The elation piece lasted just under 3 minutes, and upon termination, subjects rated their post induction level of happiness. Finally, the tape relayed the experimenter's thanks for taking part and instructed the subject to press the <space bar> on the computer, which halted RNG sampling.

There was no counter balancing of mood inductions because of the ethical requirement to ensure subjects did not leave the test area in a more negative mood than they had entered in.

Participants then called the experimenter back to the test area, and a short debriefing ensured that there had been no problems with equipment, determined the suitability of the music and answered any parapsychological questions. As with all experiments in this thesis, the experimenter and subjects remained blind to the RNG results until the entire study was concluded.

The measuring system

The RNG system was configured to generate binary outcomes at the standard 200 bit per second rate. No feedback was provided to the subject as the trial took place, and the protocol should be considered passive. Following the preparatory work outlined in chapter 6, a text generating subroutine was

incorporated into the computer code and closely matched that of program 2, where character generation is related to letter frequency.

Formal Hypothesis.

No formal hypothesis was stated pre-experiment. Instead, a generalised view that anomaly could stem from emotional change was put forward, therefore all analysis should be considered exploratory.

Results.

Table 7.2 - Results of Mood Induction

	Depression Induction		Elation Induction	
Across Ss	score	St. Dev	score	St. Dev
pre induc	22.57	23.15	42.86	31.39
post induc	85.10	24.46	100.19	20.88
shift	62.52	+2.70*	57.33	+1.83*

*based on standard deviation from pre-induc set

The table above shows the mean score across subjects, pre and post induction, sadness increased by 2.7 standard deviations, whilst the elation increased by 1.82 standard deviations. Paired sample t-tests were carried out such that, significant mood changes in the expected directions were evident: sadness - $p<0.001$, $t=-10.469$, $df=20$, and elation $p<0.001$, $t=-9.873$, $df=20$, (two tailed). As such the mood inductions can be considered suitably effective.

The debriefings at the end of each trial allow some qualitative insight into the induction process and it transpired that (with only one exception) the experiment was deemed effective. The one exception was subject 21 who reported that the depressing music had produced a marginal shift in the 'wrong' direction (i.e. he became happier). Thus all data from subject 21 was precluded from subsequent analysis. No obvious reasoning could be uncovered as to why the subject had failed to enter a sadder state, it simply seems that The Swan of Tuonela failed to engage him as predicted. From other discussions, two subjects reported that the sadness induction was so effective as to produce tears, and

that they had really got 'caught up' in the music selected. Most subjects reported that they had closed their eyes and let the music take hold, and that mood shift had occurred fairly naturally. This view corresponds favourably with the idea discussed above that the MMIP works most effectively when people do not attempt to cognise the experience. Subjects also reported using personal episodes to enter affective states, utilising actual and fictionalised events surrounding loved ones. The elation music was considered upbeat and mood congruent, whilst the neutral period encompassing the babbling brook was generally seen as soothing. None of the subjects reported that a familiarity or disliking of any piece blighted or inhibited their induction process.

RNG data

Table 7.3 – RNG data (Z tests)

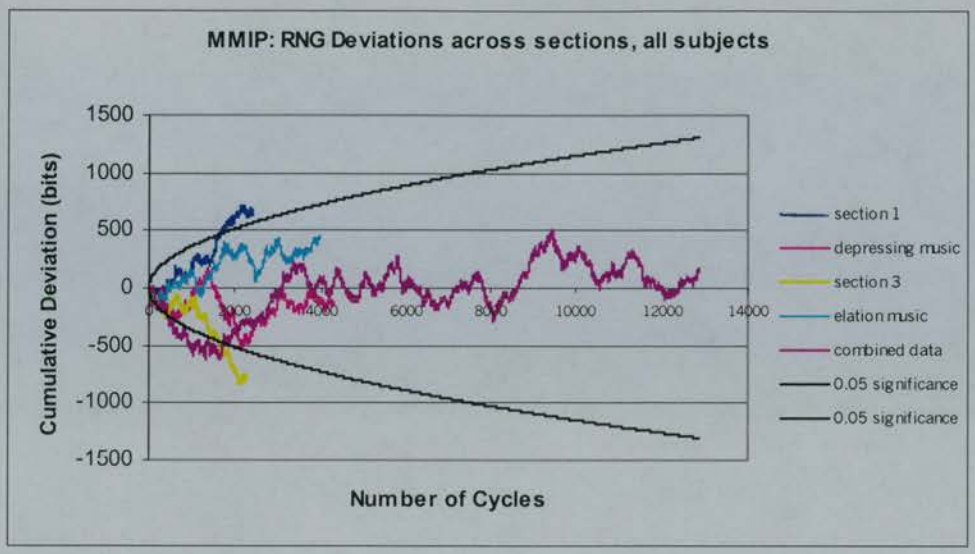
MMIP Experiment - Formal Results

All Ss **standard deviation: 6.9919**

Stimulus section	deviation	cycles	Stouffer Z	p (2 tail)
1. Instructions and neutral induction	635	2415	1.848	0.065
2. Depression induction & music	-135	4305	-0.294	0.769
3. Return to emotional neutrality	-771	2289	-2.305	0.021
4. Elation induction & music	437	3990	0.989	0.323
overall	166	12999	0.208	0.835

The results table (7.3) above and chart (7.1) below detail the overall behaviour of the RNG during each induction period. As can be seen, the opening period where subjects listened to instructions, then tried to clear their minds, proved significantly anomalous. The depression induction meanwhile showed no serious deviation from chance expectancy. Section 3, which utilised the babbling brook was highly significant terminating in a SZ score of –2.305, p=0.02, e.s. = 0.048 (in the opposite direction to section 1). The elation induction showed a positive trend (SZ=0.989) and operated in the opposite direction to section 2. Overall the cumulative deviation across conditions did not produce any significant effect.

Chart 7.1, the cumulative deviation of the RNG during each induction period.



Chi square analysis (as per table 7.4) indicates that the depression and elation inductions (music) showed highly variable non-directional deviations, whilst the 'neutral' sections showed smaller but consistent directional effects.

Table 7.4 – RNG data (Chi Square)

MMIP Experiment - Formal Results (N=21)

standard deviation: 6.9919

Stimulus section	Chi square	p value
1. Instructions and neutral induction	16.14	0.76
2. Depression induction & music	28.73	0.12
3. Return to emotional neutrailty	21.40	0.43
4. Elation induction & music	30.36	0.08
overall	28.46	0.13

RNG Text Data

The text generation program detailed in chapter 6 was incorporated into the experimental process. An example output is contained in table 7.5, below.

Table 7.5 – Text generator results, subject 12

MMIP Experiment - Text Data Results (in order)

Subject 12

Stimulus section	words generated
1. Instructions and neutral induction	hoe, sari, few, sane
2. Depression induction & music	rid, caw, tee, den, nos, ted, aid, sir, onus, lodge, are, sum
3. Return to emotional neutrailty	put, coda, gal, sew, cited, teal
4. Elation induction & music	sew, sot, haw, sis, tor, are, bee lea, ewe

Due to the exploratory nature of this approach, the experimenter served as judge to the text string outputs. A varied batch of words were produced but no obvious patterns of mood congruence emerged. On some occasions however, 'appropriate' words were generated, e.g. depression condition: "sob, bane & sad" although these are as likely to be due to coincidence as anything psi oriented. The informal evaluation process fails to take into account the personalised meaning of any words generated and it may be that words such as "motel, sofa, pert & food" (all generated under elation conditions) have real significance for the subjects who 'generated' them.

Discussion

The results from this study throw up some interesting findings. Firstly, the significant Z-test results from section 3 suggests that it is the movement between an *affect laden* mental state into an *affect free* one that promotes PK. However, the chi square analysis shows that the PK effect derives from directional properties to the data-set and not from exceptional variance. Secondly the strong emotional trends seen in sections 2 and 4 (as per chi square) did not operate with direction.

The association between direction and emotion was found by Blasband (2000) although to a much stronger degree and therefore raises a question. Is a specific emotion correlated to a specific direction in RNG output? Is happiness inherently more likely to produce ones than zeros? Such a theory seems unlikely due to the logic gate controls in RNGs that invert bits and prevent first order bias. Therefore,

one might posit that some other factor is at work that *moulds* outputs into observably anomalous patterns when desired. It may be that a third party (such as the system operator) who has 'ownership' across all trials, assigns meaning to the data in some way, so that results across participants appear anomalous. Thus two potential PK mechanisms might be at work: the straight facilitation of anomalous RNG outputs, and, an ordering effect whereby non-anomalous outputs can be made to look anomalous through directional combination and yet maintain the integrity of the system.

Returning to the mood induction, the babbling brook soundtrack seemed highly effective. It may be that such naturalistic sounds prime associative connections better than musical pieces and are thus more generalisable to the subject population. Further research that seeks to change mental states might benefit from moving away from authored sound clips into establishing a group of solely naturalistic ones (e.g. anxiety – a baby crying, depression - thunderstorms, etc).

Results from the text generator proved less successful than hoped, and no discernible patterns emerged. This does not mean that such an approach offers no future direction, and it may be that volitional studies, where subjects are instructed to generate specific words would be more suitable. After all if psi is teleological, there is no reason why the RNG's output cannot be mediated to produce 'desired' words. A better judging system would also have to designed, and would surely have to involve the subject (under blind conditions perhaps?) in determining what words were context relevant. Alternatively there may be some mileage in using the text string generator during projective tests such as the Rorschach or TAT, and the subject is incorporated into identifying salient 'messages'. Further study is required.

The presentation of external musical stimuli, seems to be an effective means of invoking mood change. Therefore using stimuli that engage additional modalities might be expected to generate replicable and effective changes with more hard to reach emotions (such as anger). Combining sound and vision into video-based stimuli should therefore provide a fruitful avenue of research.

The previous chapter illustrated how the use of mood congruent music and overt experimental instructions could produce sizeable shifts in elated and depressed mood states. However, the use of generalised music to produce shifts in anger within an unselected population is highly difficult. Therefore it was felt that the utilisation of video stimuli, which benefits from the presentation of sight *and* sound, might provide a means of invoking such emotional changes.

In a paper published in 1995, James Gross and Robert Levenson summarised five years of research spent developing a reliable group of film clips that could induce amusement, anger, contentment, disgust, fear, sadness, surprise and, what can be termed neutrality. 494 subjects evaluated 250 films, leading to a ranked list of the two most effective clips for each emotion. Since anger states are most relevant to this thesis, one can start by looking at the two excerpts chosen. The first clip was taken from the 1980 film *"My Bodyguard"*, and showed a scene where the main protagonist - Clifford Peache, was bullied by a classmate. Having watched this, 41.7% of respondents indicated increased levels of discrete anger (i.e. did not coexist with other emotions). The second clip was taken from *"Cry Freedom"*, a film which dealt with the life of the political activist Steven Biko in apartheid South Africa. In the selected scene, viewers watched as black protestors were persecuted by the white police force. This clip produced a lower and disappointing hit rate of just 22%, which in combination with clip 1 produced an average 32% hit rate. Much higher hit rates can be seen when other emotions are induced. For example amusement, disgust and sadness all scored in excess of 80%. One might argue that these disparities are a result of demand effects, whereby subjects find it easier to 'guess' which emotions the happy or sad clips are supposed to induce and thus present themselves as suitably moved. Gross and Levenson acknowledged this, and realised demand characteristics were present, however they did not believe that subjects falsely reported mood shift without actually experiencing it and went on to write: "*We are becoming increasingly convinced that elicitation of discrete anger with brief films is going to be extremely difficult, if not impossible... With films, it appears that there is a natural tendency for anger to co-occur with other negative emotions"* (p104).

It would therefore seem that anger induction is constrained in terms of a film MIP by the material itself. Without the explicit instructions that a clip is 'there to assist in mood shift', it may prove difficult to generate anger without also producing additional blended states. Pierre Phillipot (1993), who carried out research with 60 subjects on various film segments, has also addressed this co-occurrence. He concluded: *"[At the] empirical level...film segments can elicit a range of predictable emotions in the same way in a majority of individuals, although there may be some blends between anger and disgust.."* but despite this... *"Film segments can thus be considered a rich source of controlled stimuli for research on emotion."* p190

As with other MIPs, the Film MIP can be divided into two primary approaches. In the first, subjects are exposed to a film excerpt without any instructions from the experimenter, as the hope is the story itself will automatically generate the target mood in the subject. In the second, explicit instructions are provided for subjects to 'immerse' themselves in the story, to try to feel the emotions that are presented. The review discussed in earlier chapters by Maryanne Martin (1990) found the film MIP is effective in more than 75% of subjects. Likewise the research from Gerrards-Hesse et al (1994) which looked at 13 studies utilising instructions, and 39 without, (generating elation and depression), found the 'with instructions' studies were 100% effective overall across mood states. Trials that were performed 'without instructions' produced an overall effectiveness rate of 95%. In studies where subjects were induced into both elated and depressed moods, intergroup comparisons were also made (i.e. were the elation scores significantly different from the depression scores?) and proved 100% effective for both MIPs. One must caution against any conclusions derived from these reviews, since the MIP is typically not the dependent variable, rather a means of manipulating subjects (who are then tested on some subsequent task). There exists some possibility that were an MIP to prove unsuccessful, the study procedures would be refined until it proved effective. Furthermore the high hit rates are from studies that only looked at elation and depression and it is fair to surmise that these are amongst the easiest emotions to invoke.

The meta-analysis of Westerman et al (1996) did not differentiate between film and story inductions, grouping both approaches into a single MIP class. This class however was determined to be the most effective of the 11 MIP approaches reviewed, whilst a film/story induction without instructions ranked

third. The successfulness is probably due to the fact that dynamic target presentations engage multiple modalities, enhancing the experience, activating more and stronger associative connections and overall making it more salient to the individual. Westermann et al provided some further advice for researchers - *"According to our results, the effects of the Film/Story MIPs seem to be especially large when subjects not studying psychology are treated individually and are informed about the purpose of the experiment."* p576

Some specific studies that have relied upon the film MIP to manipulate emotion include Tourangeau & Ellsworth's 1979 experiment which sought to investigate how fixed facial expressions influenced the emotional experiences of fear and sadness. In order to generate fear they used clips surrounding industrial accidents, whilst the depression condition was invoked by showing an excerpt from a film where a young boy stays in an orphanage whilst his Mother is in hospital. The neutral condition simply showed flowers in a botanical garden. The authors found that although the films were potent mood adjusters, the facial expressions did not contribute to affective shift. Schotte, Cools & McNally (1990) also chose to instil fear and successfully employed a frightening film clip taken from the motion picture "*Halloween*". 60 female subjects with eating disorders completed visual analogue scales and the POMS (Profile of Mood states) to rate their mood states, and it was found that as the clip produced marked increases in anxiety and sadness, 'restrained' eaters (who are prone to binge-eating) markedly increased their intake of popcorn. The authors concluded that episodes of negative affect might prompt temporary abandonment of dietary control in such individuals. In a similar vein, Randall & Cox (2001) used video presentations to generate positive and negative mood in male subjects who were either at high or low risk from alcohol problems. Their findings showed that negative affect (measured on the PANAS) increased the desire in the high risk group to drink alcohol.

Lazarus, Speisman, Mordkoff & Davidson (1962) induced stress reactions in their subjects by showing a seventeen minute film clip showing a genital surgery ritual on young boys in an aboriginal tribe, whilst the control film detailed eleven minutes of an information about corn farming in Iowa. Different commentaries accompanied the surgery clip. Commentaries that were presented as scientific explorations into the anthropology of the procedure or which informed the viewer that the procedure

was relatively painless, produced markedly lower levels of electrodermal response than those that emphasised suffering or which had no commentary at all.

Ciarrochi & Forgas (2000) used both the film MIP and autobiographical MIP to look at how mood influences people's perception of consumer goods. 20 subjects in the autobiographical condition recalled in detail a sad or happy life experience. In the film condition 87 subjects, watched an edited clip from a *'highly successful television comedy series'* to invoke happiness and a film covering death from cancer to induce sadness. Ciarrochi reports that both MIPs were highly successful, and that subjects who scored highly on the Openness to Feelings scale produced mood congruent effects whereby mood and consumer goods evaluations correlated positively.

In 1998, a graduate student at Yale University named Kathryn Truax, initiated an internet request for films that researchers had used for invoking affective change, or choices that individuals felt might prove facilitative. The response showed a substantial breadth of possibilities but some general points could be gleaned. Experimenters tended to use comedy clips (e.g. *Four weddings and a Funeral, When Harry met Sally, Planes Trains & Automobiles*) to induce elation as the inductive link between amusement and happiness seems substantive. To induce depression, the tendency was to use clips detailing terminal illness, death and the Holocaust (e.g. *The Champ, Terms of Endearment, Sophie's Choice.*)

Unfortunately, experimenters commonly fail to divulge exactly what clips they used to induce mood, Curren & Harich (1993) for example refer to an 8 minute comedy clip, that induced positive affect; and a war film clip that invoked negative affect; but no specific details beyond this were provided. It is stating the obvious to suggest that different 'war' clips can produce different mood states, so researchers must remain conscious of the need to provide suitable referencing.

The effect of movie stimuli has also been tested under more naturalistic conditions. Joe Forgas and Stephanie Moylan (1987), interviewed 980 subjects in Sydney, Australia as they came out of a film showing. After watching one of 3 types of film - happy, sad and aggressive, (as defined by media and experimenter reviews) subjects' mood states were measured on seven point bipolar scales before

answering questions on life satisfaction, future expectations and social judgements. Views on these variables were answered in a more positive and optimistic way after watching the positive film. Negative films produced negative and critical evaluations. The experimenters estimated subject demographics and were satisfied that the effects were robust across different groups.

Sometimes the same clip is used to induce different emotions. Phillipot's study used a scene from *"Sophie's Choice"* where Meryl Streep, had to choose which of her children to send to a concentration camp in order to produce anger. Julie Tillema (cited by Truax) at the University of Illinois, meanwhile, reported that she had used the same scene to induce depression. Such examples indicate how useful and potentially necessary, emotional priming may be.

As Lazarus, Speisman, Mordkoff & Davidson illustrated, some of the debate as to whether a subject is genuinely experiencing an emotion or faking it can be addressed through physiological measurement. Mewborn & Rogers (1979), measured the heart rate and skin conductance of 48 subjects, exposed to high and low fear films; the high one being a film that was *represented* as a 'surgical procedure for removing tissue damage by venereal disease'. Following the clip, participants were verbally reassured as to the likelihood of contracting venereal disease. Subjects who had watched the surgical procedure tape and were briefed that they were at high risk of contracting the disease reported heightened levels of fear, a response that was mirrored by increases in heart rate and electrodermal activity. The increases in self-report and physiology can be held up as indicative of emotional change. Such protocols provide researchers with an effective means of validating their mood manipulations.

Throughout this thesis, attention has been directed towards the links between emotion and cognition. In 2002, Gray, Braver & Raichle specifically examined this link, using video clips and a fMRI scanner to examine how emotion impacts upon *'cognition related neural activity in the lateral prefrontal cortex'*. Using 10 minute clips from comedies, horror films and documentaries, the authors induced a single emotional state, then had their participants complete a working memory (cognitive task) where one had to decide whether a presented noun or unfamiliar face was the same as the one presented three trials earlier. The authors found that the emotional state significantly effected task accuracy and *"neural activity in a bilateral region in lateral PFC depended conjointly and equally on the emotional and*

stimulus conditions... The existence of such a remarkable pattern within a discrete region directly supports our primary hypothesis that lateral PFC is sensitive to an integration of emotion and cognition." p4118. The authors also found evidence for emotion specific hemispheric asymmetry and posited that: *"emotion inductions both reduced and imposed a psychological load, doing so differentially in each hemisphere (i.e. pleasant approach states leading to a lowered load on the left, facilitating verbal performance, and leading to lower activity."* p4119

Presentation of Slides.

In much the same way that film clips have been used to invoke mood, still slides have also been utilised. Although they do not hold the same dynamism as a moving stimulus, suitably chosen images can still have a powerful emotional impact upon the percipient. In 1990, Hugh Wagner, looked into how a subject's facial expression, under isolated conditions, changed whilst viewing 75 emotive slides. 15 male and female subjects were shown a slide every 6 seconds and asked to indicate their emotional response to each, with ticks on an adjective checklist; meanwhile unbeknownst to the participants, they were being secretly video taped and their facial expressions scrutinised. Wagner reported that the slides proved effective in shifting mood, and that the facially displayed emotions corresponded to self-reports despite the apparent absence of any party who could observe such behaviour.

Winton, Putnam & Krauss (1984) looked at the heart rate and skin conductance of 20 male subjects exposed to slides that were primarily sexual, scenic, pleasant, unpleasant or unusual in nature. Correlations were found between the pleasantness of the stimuli and the physiological measures taken, such that pleasant stimuli saw raised heart rates and skin response, and unpleasant stimuli produced a reduction in heart rate alongside heightened skin conductance. Covertly filmed analysis of the participant's facial expressions also revealed a relationship between mood and physical display.

The literature cited above, demonstrates that the use of video stimuli is amongst the most effective techniques available to the researcher in manipulating emotion. It is also apparent that the use of priming enables the experimenter to direct subjects towards certain goal states, minimising the fear that stimuli might produce unpredictable affective states. Although demand effects might persist, efforts to encourage honest reporting should reduce them to manageable levels. It also seems clear that studies

employing physiological measures can provide insight into the emotional experience, helping to validate whether subjects genuinely changed emotional state or just reported so.

Mood Induction using Video and Slide Stimuli.

Drawing upon the experience and protocols of the literature, this study was constructed to make use of both visual mood stimuli and film excerpts in provoking anger and elation responses and the effects they held over an RNG. Rather than piloting with a group of test subjects, the tape stimulus and overall procedure was verified and refined with the advice and direction of other psychologists.

Methodology

Participants

20 participants, (8 of whom were male, 12 female) were recruited from the University of Edinburgh through posters, personal approaches from the experimenter and word of mouth. Subjects were advised during scheduling that the study involved the changing of emotional states whilst watching a video, no further details were provided. The age range was from 18-29 and testing took place over a two week period between the 8th and 20th of December 2002.

Location.

Subjects were tested in a viewing room within the basement of the psychology department. This venue was chosen because of its relative isolation from other occupied offices, in an attempt to create a buffer that (might) reduce proximal and unconscious PK interactions. Once the procedure was underway, the experimenter left the test area entirely and after 10 minutes positioned himself in an adjoining room so that he could listen for the call to return to the test area. A schematic of the setup within the test area is provided later in the chapter.

Background to the experimental stimuli.

As with the Animal Rights Experiment, it was hypothesised that stimuli detailing victimisation and vulnerability could provoke empathic responses that give rise to anger, especially when the victim onscreen is unable, or incapable of stopping the 'aggression'. Since the experimental participant is

fundamentally a passive observer, he is also unable to prevent the unpleasant act, and the prediction is that empathy will heighten frustration levels and precipitate an increase in state-anger. From the parapsychological perspective, once again the hypothesis is that the heightened negative mood state, and the shift away from these states, might facilitate PK.

Choosing suitable film clips that can be applied to an unselected population is no easy matter. This induction process can be considered relatively more powerful than alternative approaches because it is utilising both sensory modalities of vision and sound. Furthermore, it forces the subject to address a specific pre-determined target instead of, for example, an internally generated one. Care must be taken to find clips that minimise confounds. Whilst a narrative can be written to avoid divulging the age, ethnicity or gender of a particular character, a film clip displays these characteristics for all to see, and any prejudices or biases against a particular demographic might influence the mood shift. For example, the clip above from *"Cry Freedom"* where white policemen round on a black crowd, may have been employed to evoke the state of anger, but within an unselected population, some individuals with strong political views may derive entirely unexpected emotions from the scene. These emotions may be considered publicly unacceptable by the percipient and are thus wilfully misreported to the researcher. Although on the surface, the mood induction might appear successful, whatever other variables are later measured are confounded. As such excerpts that revolve around racial, political, sexual, and social beliefs need to be treated with caution.

Choosing film clips also runs the potential risk that a powerful piece might unearth repressed memories, especially if it details an act of a violent or sexual nature. For example, a clip showing a serious sexual assault (such as that from *'The Accused'* (used by Gagne & Reis, cited by Truax) would generate anxiety in a suitably primed subject, but may invoke trauma in somebody who had a connection with such an episode. Internally generated mood episodes (such as autobiographical recall) would not be expected to provoke such incidents as they do not force the subject directly to confront any such repressed memories. Experimental (non-clinical) psychologists are rarely equipped to handle such outcomes and as such need to avoid the possibilities of encountering them, or at the very least ensure that suitable informed consent procedures are in place. To get around such problems, the

decision was made in this study, not to use highly any hugely evocative or distressing pieces but rather to use lower level clips in combination with pronounced instructions.

Onscreen instructions were presented dynamically in several ways. Firstly, colour was used in much the same way as detailed in the Velten chapter. Red screens were used to signify anger, green for emotional neutrality and a yellow/orange combination (alluding to a sunset) for the elation section. Mood instructions were highlighted by using coloured borders and a variety of animation effects.

Formal Hypothesis

[in line with the results of chapter 5]

The dissipation of state-anger would facilitate significant RNG output anomaly.

Materials: The stimuli.

A 10-minute video presentation was custom written which contained a combination of real time video clips and dynamic instruction slides, an original approach to mood induction. Thirty-two individual components were shown, some of which are displayed below. The stimuli were presented to each subject individually, and the researcher left the experimental area during testing, remaining blind to the activity within the laboratory. This was primarily to reduce potential effects upon the RNG system, but also to facilitate more substantial mood shift by minimising any potential embarrassment a subject may have felt in front of a third party.

The Video Presentation.

Stage 1 – Clearing the mind of emotion.

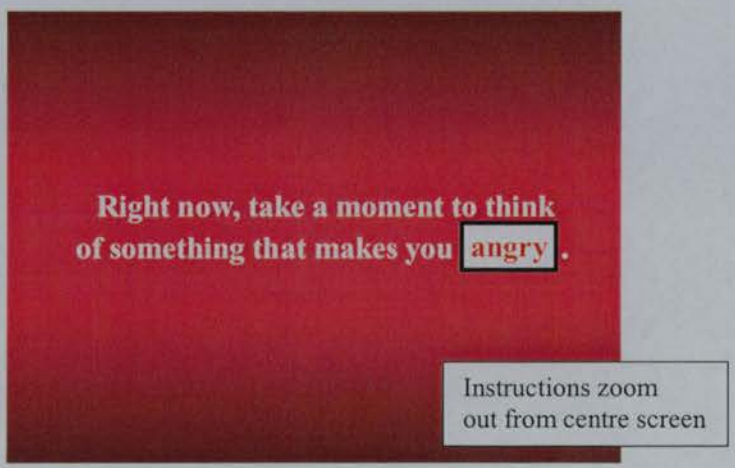
The opening screens welcomed subjects to the experiment and attempted to guide subjects into bringing about an initial emotion-free state. Onscreen instructions urged subjects to become *'as emotionally neutral as you can'* [slide 2] and to *'Relax'* [slide 4, below]. These instructions were presented against a neutral green background laterally bordered by dark edging to focus attention on the instructions. The words themselves were animated dynamically such that they moved, rotated and dissolved onto screen. Prominent words were highlighted using alternative fonts, font sizes and borders, once more to turn the subject's attention to pertinent instructions.

Slide 4

Slide 4 (above), shows part of the initial neutral-state induction. Following this slide, subjects were directed to the self report sheet and invited to rate their state-anger on a Visual Analogue Scale 140 mm in length. The particular scale was rated at one end as *'not at all'*, and *'very'* at the other.

Anger Induction.

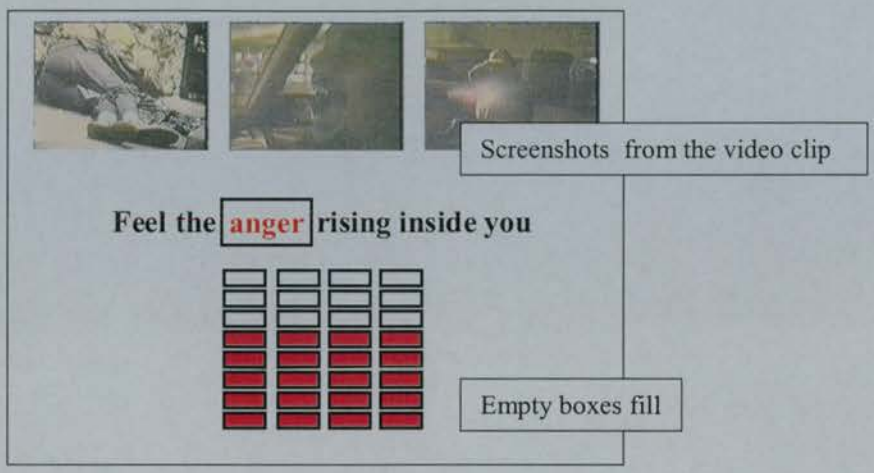
Following the initial mood rating, subjects were explicitly asked to put themselves into an angry state, through the use of several slides, characterised by number 9 below.



Slide 9

Directly after these instructions the first of two video clips was presented. In the first, an excerpt from the television programme *"Criminals Caught on Tape"* was played where four *multi-ethnic* young men are shown driving through Los Angeles firing paintball guns at passers-by, including the homeless and a young boy on a bicycle; these acts were filmed on a camcorder by the young men themselves and the soundtrack contains a voiceover from the programme makers, and the perpetrators actual commentary

(which is primarily laughter). After this clip was shown, three video stills of the footage were displayed, beneath which a metaphorical 'anger' matrix filled [Slide 11].



Slide 11

The second clip was taken from the motion picture *"Witness"* and showed a scene where a small number of Amish individuals travel into their local town. Their progress is barred by a group of locals who verbally assault them before turning to a specific member and smearing ice-cream into his face. Directly after this clip, participants were asked to rate their new level of state-anger, on a VAS as above.

Returning to the neutral state.

Following the anger induction, the cue for subjects to overtly influence the RNG was made. Slide 14 shows how subjects were told to begin transferring the negative emotion from themselves onto the RNG.

Slide 14

As part of this transfer period, subjects were instructed to return to an 'emotional neutral' state (slide 15), and to feel the anger wash away (slide 16).

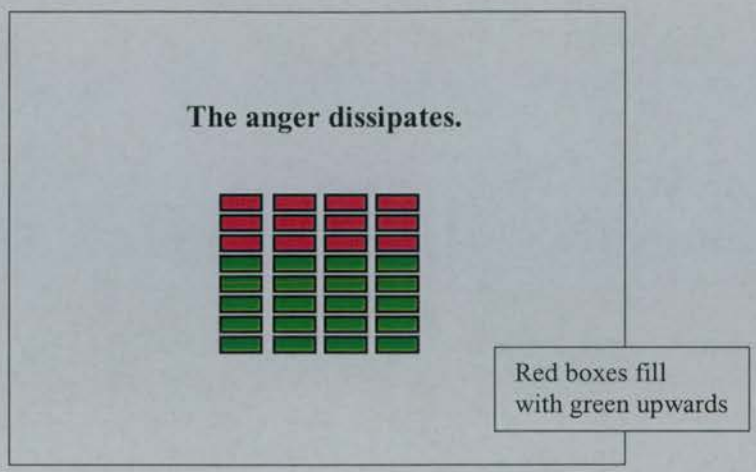
Slide 15

Instructions rotate

Slide 16

Instructions zoom out from centre screen

To further assist anger displacement, the anger matrix was re-displayed (slide 17), but over a period of some twenty seconds, the red blocks were replaced by neutral green ones. Once the matrix had been re-coloured, and the neutrality period had been completed, subjects were asked to rate their elation level on a VAS, as per above but relabelled with *'not at all'* on the left hand pole and *'very happy'* on the right hand one.

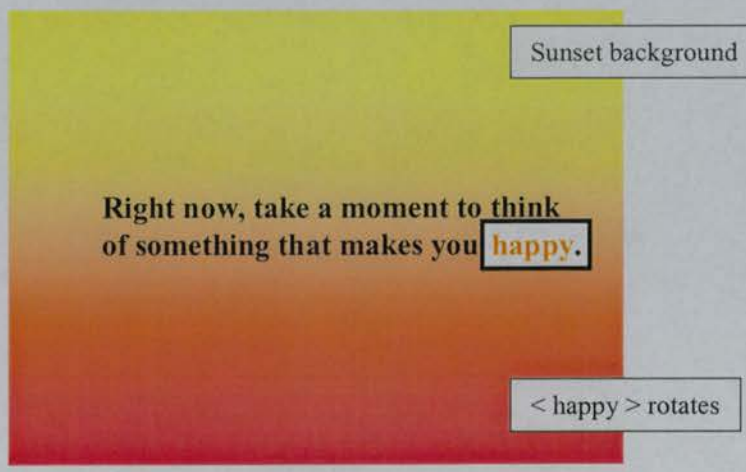


Slide 17

Elation Induction.

Following any anger induction, the experimenter is ethically bound to restore the subject to a positive condition, and as such an elation section was employed which utilised explicit instructions, alongside positively valenced photos from the International Affective Picture System. The IAPS is a widely used database of mood congruent images and has been successfully employed in a variety of psychological studies (e.g. Aftanas et al 2001, Canli et al 1999, and Snyder & Harris 1997). The pictures incorporated into this experiment, were selected on the basis of highly ranked images in a study by Ito, Cacioppo & Lang (1998). They asked 509 male and female undergraduates to rate 472 IAPS images and it was felt that the probable subject pool for this study (in terms of demographics) should overlap with Ito's group.

To induce elation, slides were presented that urged subjects to invoke happiness. Participants were asked to recall a particularly pleasant incident (slide 20)



Slide 20

After some 30 seconds, participants were shown a sequence of IAPS images. The chosen images were each displayed for 10 seconds, with no time gap between presentations. The pictures (and their IAPS codes in brackets) were:

1. A smiling baby (2050)	6. Dolphins playing (1920)
2. Five kittens (1463)	7. Rabbits sharing a flower (1750)
3. A loving family (2360)	8. Fireworks display (5910)
4. A bowl of ice cream (7340)	9. Puppies (1710)
5. A couple on a beach at sunset (5830)	

Subjects were advised onscreen to use the pictures 'to assist' in generating positive mood. Slide 23 provides an example of one of the IAPS slides.

Slide 23.
2nd IAPS image

Onscreen for 10 seconds

After the final IAPS image, subjects rated their new level of elation on a VAS, before an onscreen message thanked them for their participation. After this, the participant called the experimenter back into the test area.

The RNG system.

The RNG was set to run at the standard 200 bits per second rate, and was placed within view of each subject. No feedback was provided to the subject and the experimenter remained blind to all data until the final trial had been collected. (See schematic 8.1)

Text Generator

Following the inconclusive results to the exploratory work with text strings seen in chapter seven, the same text generating subroutine, (i.e. related to letter frequency) was incorporated during this study.

EDA methodology.

Electrodermal measurements were taken to examine changes in physiological arousal during the induction procedure. Care was taken to follow the recommendations put forward by Schmidt and Walach (2000) detailing minimum standards in EDA measurement. Subjects were tested on a Contact SC5 24 bit stand-alone skin conductance coupler, at a sample rate of 40Hz. Two (silver/silver chloride) electrodes were applied to the medial phalanx of the forefinger and middle finger. The electrode wells were filled with a conductive gel and smoothed out to avoid air bubbles. A minimum lag period of 10 minutes was allowed between electrode application and data recording. Subjects were instructed to avoid hand movement, and Ebbecke wave generation was minimised by preventing strain on the electrode cable. The EDA data was primarily employed as a manipulation check; Strongman's (1987) warning that *"There are only poor relationships between changes in skin reactivity and (1) the intensity of the stimuli which produced them, (2) reports of emotional reactions, and (3) distinctions between pleasant and unpleasant emotions."* p61 was duly noted.

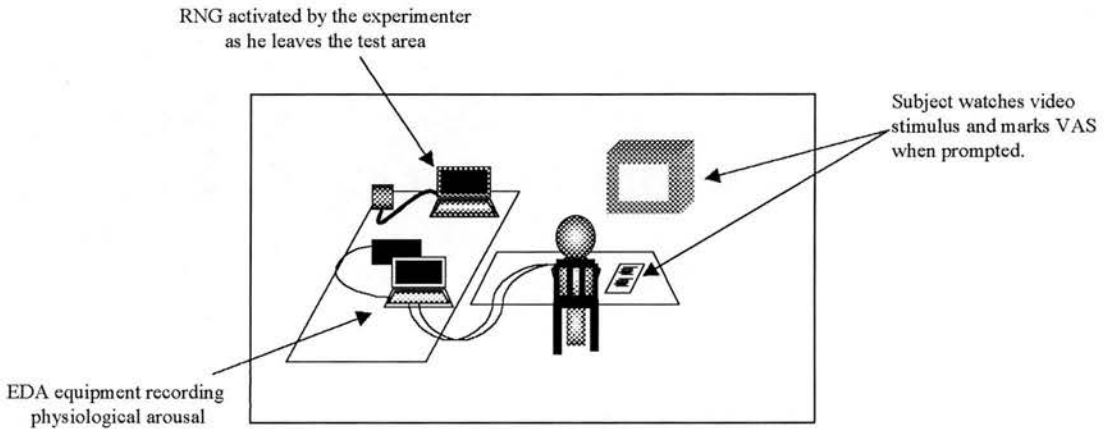
Procedure.

Upon entering the test area, subjects were hooked up straightaway to the EDA, as up to 10 minutes is required for the conductive gel to reach optimum operating levels. Subjects were informed how the experiment sought to instil anger then elated affective states, and that they would be asked to try and actively enter these states. To counter demand effects, the experimenter took a significant amount of time and effort to emphasise that the subjects needed to give honest appraisals of their mood states. Just as importantly, it was made clear that the induction did not necessarily work with everyone, and if subjects failed to feel a significant change in mood, they should not be overly concerned. Participants were also advised to use the emotional stimuli presented on the tape in whatever way they thought best. The experimenter did not start the experiment until he was satisfied that subjects were comfortable with the protocol.

Participants were also shown, and advised as to the purpose of the RNG, which involved a brief explanation of how it operated (using the analogy of a coin tosser), and why it was used in parapsychological experiments (people appear on occasion to influence its behaviour). Subjects were not asked to actively influence it unless explicitly instructed - rather they were to concentrate on the video, and shifting their emotional states. However, participants were also informed that at a certain part of the tape, an instruction would be made to try and influence the measuring system by transferring any pent-up anger from themselves into the RNG. Several possible strategies were suggested, including the emanation of waves from mind to machine or the block transfer of affect, but subjects were given free reign to use whatever method they thought most suitable. Time was taken by the experimenter to ensure that despite holding scepticism, subjects would still try to transfer any emotion when asked to do so.

Following this briefing, the experimenter left the subject alone to spend a couple of minutes relaxing and establish an EDA baseline. Upon re-entering the test area, the experimenter moved straight away to activate all recording equipment and start the video stimulus. Subjects were not asked to activate equipment as this may have proved distracting, anxiety invoking and (to be frank) provided too great an opportunity for the participant to bungle data collection. Although the experimenter's presence at the point of activation is another variable to be considered, it was the only way to start the systems without relying on a vastly more sophisticated, remotely operated arrangement. Once the experimenter vacated the laboratory, he engaged himself with another task and returned to the test area after being called by the subject.

Schematic 8.1 – Experimental setup



The schematic (8.1) above gives an indication of the set-up in the laboratory of equipment and subject. The RNG is in plain sight so that participants could focus upon it when asked to dissipate their anger. There was no feedback provided on the laptop monitor. Any attempts by the subject to 'physically' interact with the RNG should not produce any causal anomaly, as these devices are designed to prevent such behaviour altering the outputs (see RNG chapter).

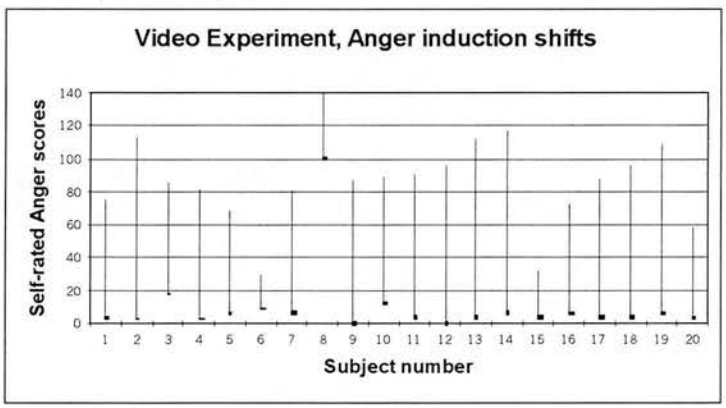
Table 8.1 – Results of Mood Induction

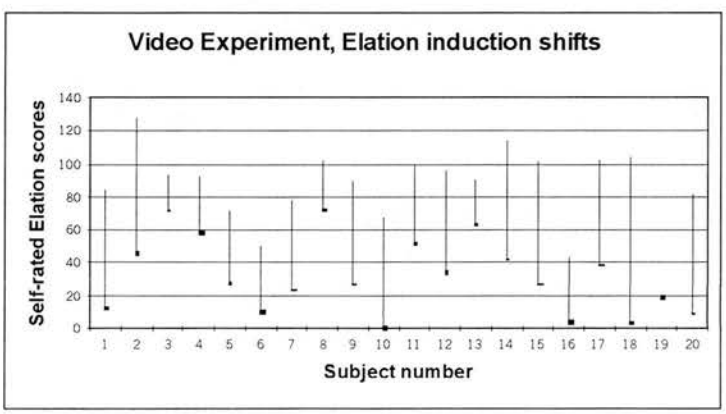
	Anger Induction		Elation Induction	
Across Ss	score	St. Dev	score	St. Dev
pre induc	9.70	21.60	31.55	22.83
post induc	86.10	26.69	85.40	25.22
shift	76.40	+3.54*	53.85	+2.36*

*based on standard deviation from pre-induc set

Table 8.1 above indicates a mean increase in anger of 3.53 standard deviations and a subsequent increase in elation of 2.36. Paired sample t-tests showed that the differences between pre and post inductions were significant: anger, t = -13.318, d.f. = 19, $p<0.001$. Elation, t = -10.049, d.f. = 19, $p<0.001$

Charts (8.1 and 8.2)





Charts 8.1 and 8.2 (left) show individual subject mood shifts. The bottom value of each line represents the pre induction score, and the top value, the post induction level. Regarding the anger induction, only subject 6 showed relatively low levels of emotional change, whilst it should be noted that in the elation induction subject 19 only shifted in happiness by +1 point.

RNG results

Because the RNG and Video were manually started by the experimenter, some concern was held that the two may not have been activated in perfect synchronisation, and since they were not in perfect synchronisation the boundaries between induction periods may have become 'blurred'. If, for example, an induction period was expected to be between 200-300 seconds of the experiment, it may in reality have been 201-301, 199-299, or similar. Shrinking the period to be examined by 3 seconds (e.g. 103-197 solves the problem to an extent but might be considered arbitrary (why not 4 seconds to be even safer), thus to counter this problem, the author employed what are herein referred to as 'fuzzy boundaries'. As Schematic 8.1 (beneath) shows, the RNG data presented in the finalised results was a mean calculation of a single data episode looked at from 3 perspectives. These corresponded to data 3,4 and 5 seconds within the expected experimental boundaries. Thus whilst the results may not produce a perfect representation of the RNG's behaviour during the experiment, it provides a conservative estimation of its true functioning.

Schematic 8.2 – Representation of fuzzy boundary

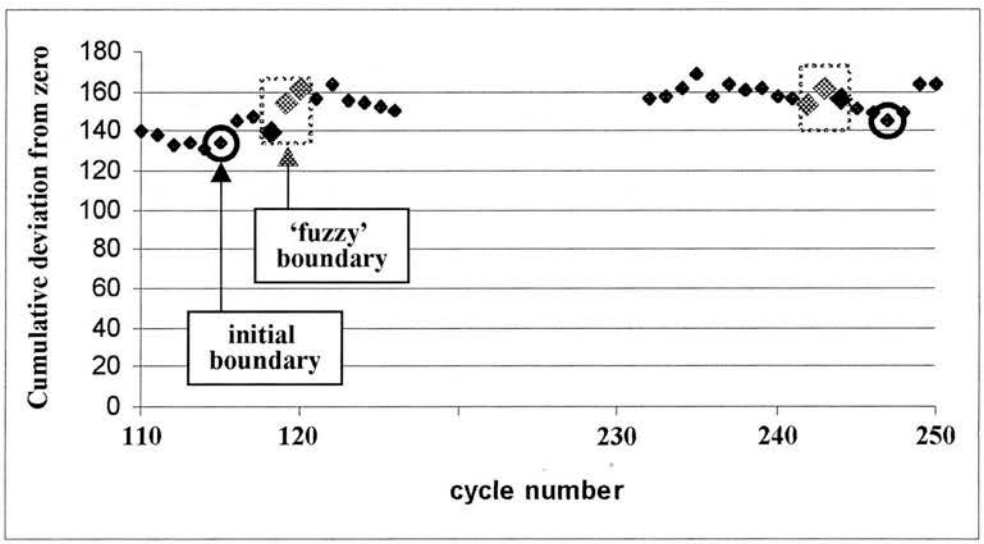


Table 8.2 - Results Table (Z test, Fuzzy)

Video Experiment - Formal Results

All Ss **standard deviation: 7.0924**

Stimulus section	deviation	cycles	SZ	p (2 tail)
1. Instructions	-22.7	1180	-0.093	0.926
2. Anger induction	515.0	5040	1.023	0.306
3. Anger dissipation	14.7	1240	0.059	0.953
4. Elation induction	37.7	2940	0.098	0.922
overall	544.7	10400	0.753	0.451

As table 8.2 indicates, the RNG showed very little anomaly across conditions. The exception being the anger induction section which produced a terminal stouffer z of 1.023, corresponding to a p value of 0.153. As such the formal hypothesis (in terms of directional effects) cannot be accepted. The chart beneath (8.3) shows the averaged 'fuzzy path' of RNG behaviour during the experiment.

Chart 8.3 – Cumulative deviations of RNG activity

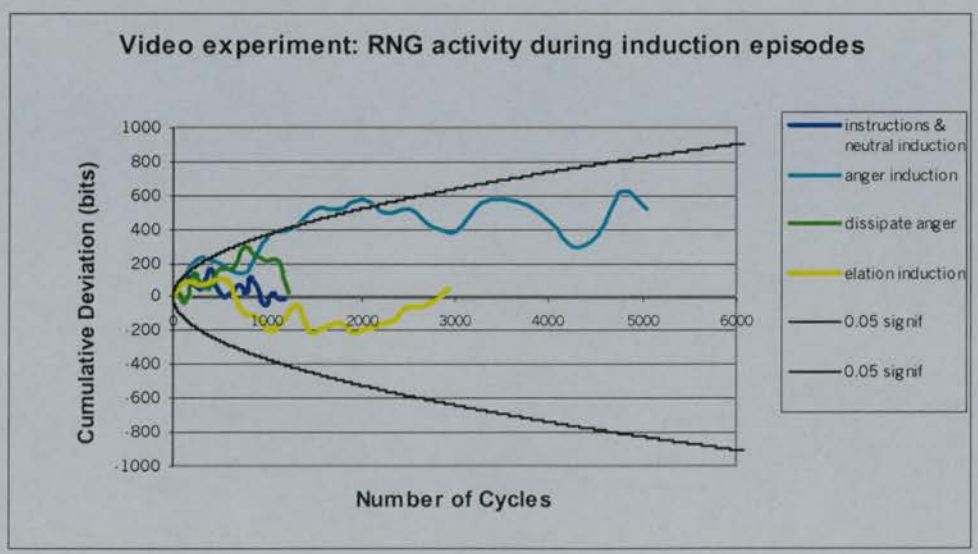


Table 8.3 - Results Table (Chi Square, fuzzy)

Video Experiment - Formal Results Chi Square results

DF = 20 **standard deviation: 7.0924**

Stimulus section	Chi Square	p value
1. Instructions	21.978	0.342
2. Anger induction	22.077	0.336
3. Anger dissipation	32.729	0.036
4. Elation induction	13.804	0.840
overall	16.839	0.663

Chi square analysis shows that, with the exception of section 3, no significant anomaly took place. Section 3 however attained a χ^2 value of 32.729, (d.f. 20), and a p of 0.036 (corresponding to an effect size of 0.051), indicating that whilst a directional effect might be absent, RNG functioning during this period is significantly anomalistic. The formal hypothesis is thus retained, in relation to non-directional RNG anomaly.

Table 8.4 - Correlations between mood and RNG behaviour

Pearson correlation between size of RNG output (direction not included) and Strength of Mood

	Mood			
RNG output	*Terminal Anger*	*Shift in anger*	*Terminal Elation*	*Shift in Elation*
Anger Induction Period	-0.005	0.131		
Anger Dissipation Period	0.236	0.067		
Elation Induction Period			-0.249	0.01

Spearman correlation between size of RNG output (direction not included) and Strength of Mood

	Mood			
RNG output	*Terminal Anger*	*Shift in anger*	*Terminal Elation*	*Shift in Elation*
Anger Induction Period	-0.121	0.011		
Anger Dissipation Period	0.169	-0.027		
Elation Induction Period			-.470*	-0.037

* = signif at 0.05 (two tailed)

Table 8.4 indicates little in the way of correlation between RNG and state-anger during the anger induction process. However a strong positive trend emerges between the output of the RNG during the dissipation and the level of state anger just prior to this period. Another strong trend is that individuals with relatively lower levels of elation produced greater RNG anomaly during the elation induction.

EDA Results

Chart 8.4 – average EDA output

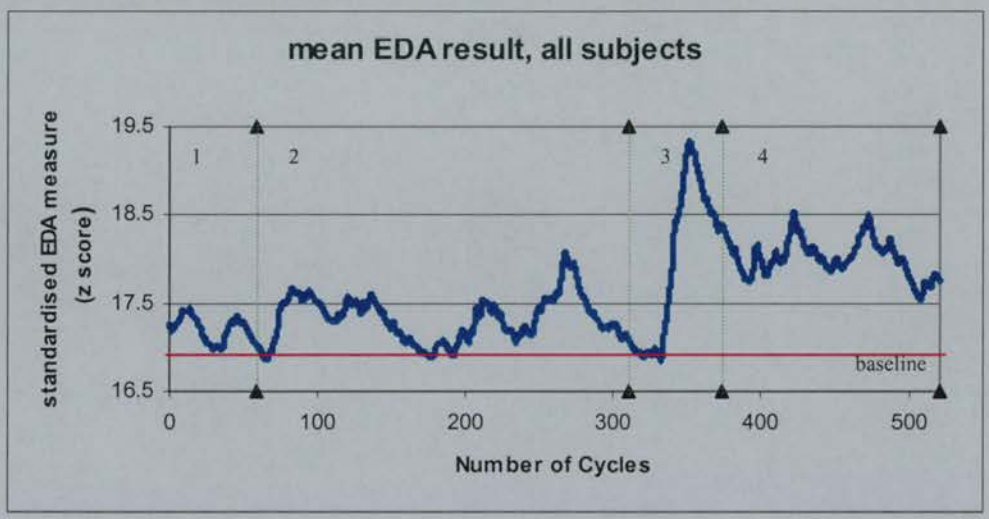


Chart 8.4 shows the mean electrodermal output across subjects. Each output was converted from the absolute micro-siemens values into z scores, which were then combined and averaged to produce the overall view, shown above. The baseline figure represents the average value that was recorded immediately prior to the induction procedure. Two methods of looking at EDA outputs can be summarised. Either the arousal level as a whole (with general increases or decreases) can be used, or in other cases the number of peaks counted. The purpose of the EDA in this study was to provide a manipulation check, ensuring that arousal levels changed as the induction periods were concluded and self-reports completed. Because of this, the first method of analysis was used. As can be clearly seen, although section 2 shows some increase in electrodermal activity, it was predominantly section 3 that showed the most response, with an increase of some 2.5 standard deviations from baseline. Section 3 corresponded to participant's mental exertions on transferring their pent-up anger states onto the RNG. Section 4 (elation) also shows a heightened response but this is most likely a tailing off of activity from

the previous section. In turn, these results provide support for the idea that the induction instructions produced genuine effects.

EDA Correlations.

EDA and self reported mood

N.B. EDA values for section 2 were calculated as the shift between maximum and minimum. Section 4 presented difficulties because of the residue from section 3, as such EDA shift is measured by the values from the beginning and end of the induction period (overall reduction of EDA). EDA shift during section 3 cannot be correlated against self-report mood data as there was no measure of state-anger at the end of the dissipation period (rather there was the first rating of 'how happy' an individual was). Note there are 19 degrees of freedom, as EDA data from subject 8 is missing.

Table 8.5 – Correlations between EDA and Mood Shift

DF= 19	Pearson correlation between EDA shift and self reported mood change **Self reported mood change**					Spearman correlation between EDA shift and self reported mood change **Self reported mood change**				
	Terminal Anger	*Shift in anger*	*Terminal Elation*	*Shift in Elation*		*Terminal Anger*	*Shift in anger*	*Terminal Elation*	*Shift in Elation*	
EDA *Anger Induction Period*	0.072	0.058			**EDA** *Anger Induction Period*	0.15	0.092			
Elation Induction Period			-0.366	*-0.46				-0.196	-0.411	
					* = signif at 0.05 (two tailed)					

Table 8.5 indicates a limited positive correlation between EDA and self reported increases in anger. Although there appears to be a significant negative correlation between change in elated mood and EDA, this data is seriously confounded by the residue of the dissipation period. Thus no conclusion should be drawn from it.

Table 8.6 – Correlations between EDA and RNG output

DF= 19	Pearson correlation between EDA shift and size of RNG anomaly (direction not included) **RNG output**		
	Anger Induction Period	*Anger Dissipation Period*	*Elation Induction Period*
EDA			
Anger Induction Period	-0.276		
Anger Dissipation Period		0.425	
Elation Induction Period			-0.22

	Spearman correlation between EDA shift and size of RNG anomaly (direction not included) **Self reported mood change**		
	Anger Induction Period	*Anger Dissipation Period*	*Elation Induction Period*
EDA			
Anger Induction Period	-0.256		
Anger Dissipation Period		0.426	
Elation Induction Period			-0.084

* = signif at 0.05 (two tailed)

Table 8.6 shows one major trend, where an increase in EDA during the dissipation period correlates with an increase in RNG anomaly. A lesser trend where lower EDA levels correlate with RNG anomaly during the anger induction period is also evident. The reader is advised that all correlations for EDA and RNG measures are taken from very noisy datasets. The relatively low power (N=19/20) means no firm conclusions should be drawn.

Results text generator.

On average subjects produced 29.4 words during the test session (range 22-41). Once again due to the exploratory nature of this part to the study, the experimenter acted as judge – looking for mood congruent words. Despite the occurrence of some *potentially* relevant words (e.g. during video clip 1 – subject 16 generated "sore", and subject 15 "pain"), little in the way of meaningful data was generated.

Discussion

Firstly, it would appear that the induction method proved successful. Sizeable shifts between pre and post anger and elation levels, signified that the Film MIP, with the particular excerpts chosen here, was

a powerful means of manipulating affect. During the debriefing a small minority of subjects reported that in themselves, they did not consider the film clips especially moving, and if mood instructions had not been provided, they doubted whether they would have become angry. Conversely the IAPS images were universally considered efficacious, and although it may appear callow or unsophisticated to invoke happiness with pictures of kittens, rabbits and puppies – the approach works.

The debriefing also unearthed evidence that some subjects felt misgivings as to how they would be able to transfer any emotion into a physically isolated electronic device, and this lack of belief (as per Batcheldor) may have hindered PK activity. It may be worthwhile, with future studies, for the experimenter to provide *extensive* information on previous research in order to boost expectations. Alternatively, efforts might be made to carry out sheep/goat testing, and then sort the data accordingly.

As for the RNG results, support is provided for the idea that it is the dissipation of negative mental states that help facilitate PK functioning. Although the results fail to show the directional effects seen in previous chapters and with other researchers, they remain consistent with the idea that emotional shift precipitates psi. The electrodermal data provides some backing for the belief that reported mood change (as per the Visual Analogue Scales) was not fabricated due to demand effects, furthermore the jump around section 3, indicates a likelihood that participants made genuine efforts to abrogate their anger.

Although the correlations need to be treated with caution, they seem to show how terminal emotion levels operate on the RNG. High levels of terminal anger seemed to facilitate RNG anomaly whilst higher levels of happiness seemed to inhibit it, it was the less happy subjects who were responsible for anomaly.

The text generating protocol failed to provide evidence for any meaningful information transfer under these experimental conditions. It may be that binary deviations and informational anomaly are mutually exclusive and do not both operate at the same time. Thus, there is some cause to consider continuing with non-orthodox approaches, perhaps under feedback conditions or where deviations from mean

chance expectancy are entirely discounted. In turn, the development of other means of looking at RNG behaviour is recommended.

The previous chapters have witnessed empirical testing within the laboratory. Despite the positive results, some might argue that there is little ecological validity in such an approach. Thus the following two chapters see a more naturalistic program undertaken, with the RNG positioned in suitably emotive environments.

Chapter 9 – FieldREG I

The evidence for mind-matter interactions within this thesis and from other laboratory based trials raises the question of whether variables perceived to have a role in PK (e.g. affect), can be unearthed in real world circumstances. Unfortunately the emotional manipulations in the preceding chapters that contrived discrete affective states are rarely found outside the laboratory, and blended emotional states are the norm. Nonetheless, there is a great deal of sense in shifting focus from closed laboratory systems into more open and ecologically valid field settings.

The FieldREG studies of Nelson et al (1996, 1998) and Radin et al (1996) discussed in chapter one, illustrate the usefulness of taking RNG samples outside the laboratory. In turn, several experiments have been run which specifically looked at mind-matter interactions during sports matches, as it was hypothesised that the heightened emotion at matches might prove conducive. Nelson et al (1998) took in-situ RNG measurements at various Princeton football matches (gridiron) and wrote: *"Analysis of the early applications focused on the home team touchdowns while ball possession by the home team defined the analytical segments in later games. The results show little indication of an anomalous effect in either mode, despite the expectation that sports activities are powerfully engaging and would seem to be a likely source of a group consciousness effect."* p443. In other words, Nelson looked for anomalistic effects (against mean chance expectancy) during scoring moments and home team possession which would reasonably be expected to show group effects from the home fans. Although 'little indication' of any effect was apparent, the authors do point out that they considered the games sampled to be somewhat 'lacklustre' (crowd reaction). The 1996 Superbowl telecast was also investigated but this time, analysis centred around ball possession. Once more, little in the way of evidence for anomaly was uncovered, although the authors noted that the effect size was *"comparable to the average across the confirmatory applications."* p443 (effect size of confirmatory applications 0.0049).

Conversely Dick Bierman (1996), whilst investigating a poltergeist outbreak within the residence of a Dutch family, found significant anomaly from an RNG positioned proximally to the family members watching a televised football final. Such results hint that sporting telecasts, under the right (as yet

unidentified circumstances) might provide a suitable catalyst for PK production. It may be that group cohesion and viewer interest do have some role to play, but in conjunction with other factors.

FieldREG studies appeal for one obvious reason - they offer insight into real world psi operations. Although accusations might be levelled of weaker fraud prevention and that experimenters can only guess at the 'workings' of the situation, it may be that environmental measures are useful because they are less artificial than laboratory based research. RNG sampling devices are supposedly non-influencible, therefore there should be no greater objection to operations within someone's home or at a sports match over the laboratory worktop. The source of the PK provides the main problem to the experimenter, there always remains the chance the root cause is some undetermined environmental source. Thus researchers need to be conscious of as many factors as they can, including their own mental states (as particularly potent moods might confound the data), global factors (such as local sidereal time or geomagnetism), the implications of any specific outcomes, the needs/desires of individuals within the test area, as well as the fact that anomaly (in terms of a physical source) can stem from the vertical as well as the horizontal (consider individuals above and below the test area).

Problematically, both of the studies above suffer because of the need to treat all spectators as part of a single cohesive system. Consistently, research from sports psychology has shown how the *level* of 'fandom' (support for a team) impacts upon psychological functioning. Cialdini et al (1976) investigated what is commonly termed the BIRG (Basking in Reflected Glory) effect. Across seven large American Universities, they examined how students identified with their University after their gridiron team won or lost. They found that students wore significantly more school identifying apparel when their team was winning than losing; in addition when discussing the team, reference was made to 'we' when the team won and 'they' when it lost; a finding supported by Lee (1985). The typical explanation for why this occurs stems from social identity theory whereby being associated with a winning team boosts self-esteem and perceived social identity.

In addition fandom can be divided into those who identify highly with the team, and those whom do so to a lesser extent. Wann & Branscombe (1993) found that high identifiers showed greater emotional involvement and investment in their team, held greater expectations for the team and considered other

supporters as 'special'. In a later study, Wann & Branscombe (1995) found a significant in-group/out-group bias such that high identifiers showed strong in-group favouritism for other supporters, represented by the perception of more positive traits and fewer negative ones. Previously Wann & Dolan (1994) had found that high identifiers presented attributional biases. Team successes were due to inherent strengths, whilst failures were the result of external factors. As they concluded: *"The data reported here seem to indicate that supporters of the same team who differ in level of identification also see different games."* p789

Hirt et al (1992) looked at how the moods and self esteem levels of fans were influenced by victory or defeat at a live basketball match. They went on to report: *"Our findings demonstrate that the viewing of a winning or losing performance by one's favourite team does affect subjects' mood state. Moreover our results show that subject's estimates of their own future performance as well as the teams' future performance are affected by the game outcome."* p730.

In a conceptually similar experiment to Hirt et al – Schwarz, Strack, Kommer, & Wagner (1987) also looked at how a match can 'crystalise' affect post-event. The researchers interviewed 55 male subjects on the telephone following two football games from the 1982 World Cup. One match was considered exciting in terms of gameplay, the other boring. Schwarz found that the moods induced by the games altered the view that subjects held on life in general. Having watched the exciting game, subjects were more positive in their view of life; whilst after the boring game, they were less positive.

Bernhardt, Dabbs, Fielden & Lutter et al (1998) showed how the physiology of an observer can change when a favoured team wins or loses. They took saliva swabs to measure testosterone levels of fans under two conditions, the first where 8 male subjects watched a basketball game live, and secondly where 21 male subjects watched a World Cup football match on television. Both conditions showed the same result, that when the favoured team won, testosterone levels increased, and when the favoured team lost, testosterone levels decreased. The authors provided an explanation in terms of competitive encounters (even vicarious ones) proving adaptive: *"Success in competition leads to an increase in status and an increase in testosterone. Higher testosterone levels increase the likelihood of approaching and winning the next encounter, thereby perpetuating a status difference produced by the*

first encounter. Similarly failure leads to a drop in status and a drop in testosterone, which decreases the likelihood of approaching and winning the next encounter." p61 Whilst the dependent variable in this study was testosterone, this study shows similarity with the previous ones above, showing how status is affected by winning and losing.

Thus when utilising RNG measures in sporting group situations, it is very difficult to determine accurately what psychological factors are at work. Whilst Nelson referred to the Princeton Gridiron game as lacklustre (implying that dull games were not conducive for mind-matter interactions), boring games may still have substantial effects on spectators' psyche. The mix of fans at the Princeton game will remain unknown, but it might be that many high level fans were present for whom winning was more important than excitement. The level of support that a person has for the team obviously effects the emotional processing that person perceives whilst watching the game, such that there may be substantial differences in state-emotion, arousal and belief, all interplaying with one another and muddying the proverbial water.

Although the research has demonstrated how the outcome of a match can influence a spectator, it is also worth noting that mental states during play are transitory, as games can rapidly turn on their heads. Losing a goal can turn elation to despair, expectation can heighten around certain periods (penalties), contentious decisions can generate indignation. Furthermore, an individual's level of support can bias expectancy such that on occasion, (blind) faith in a favoured team will persevere, despite the apparent reality of the situation, sustaining mood states.

Without extensive evaluations, the psychological set of an individual or group has to be treated as a black box, and conclusions can only be tentative. Post-hoc interviews may provide some clarification as to what was going on, but are open to re-evaluations, misperceptions and mis-remembering. Despite these problems – positive patterns still need to be searched for and evaluated; the bottom up approach of finding an effect, and inferring a pattern afterwards probably offers the researcher the most economical way forward. Any apparent trends can then be followed up with more rigorous laboratory research.

The experiments above have shown that simply placing a group of people together to watch a sporting event and determining that event's cohesiveness does not fully reveal the complexities involved. Of course, detailed psychological testing of spectators before, during and after matches negates much of the ecological validity of a FieldREG approach, as attention is directed from the match onto the study trials. Thus a satisfactory middle ground may stem from naturalistic covert RNG measures and anecdotal experimenter reports as to the state of the group.

Part 1: Football World Cup 2002

Methodology.

Sampled Episodes

RNG outputs were informally gathered during 26 live televised matches from the 2002 Football World Cup.

Participants

A variety of spectators watched the televised games. These viewers varied in number between one (the experimenter) and twelve. Subjects were part of a convenience sample such that group size and characteristics were dependent upon whoever was present. Groups were made up of friends of the experimenter, would include both sexes (although predominantly male) and hold a typical age range between 20 and 30.

Location

The matches were watched within the residence of the experimenter. This was a 2nd floor flat within a four storey terraced block. The viewing area was the primary living space within the flat and spectators were free to position themselves as they pleased to view the matches.

The RNG

The standard protocol was employed, sampling at 200 bits per second. No instructions for viewers to attend or actively influence the sampling process were made, nor was any feedback provided.

Procedure

The experimenter was responsible for activating the RNG before the game began and noting the timings (on a recording sheet) for important moments within each game, (e.g. gameplay periods, goals, sendings off and penalties). The experimenter remained entirely blind as to the output of the RNG during sampling. The synchronisation between important moments and the RNG were facilitated by a second-to-second counter displayed on the laptop's screen. In addition the experimenter was responsible for speculatively gauging the moods and arousal of the assembled group, as well as incorporating the implication of match outcomes into the psychological perspective.

Some games were precluded from analyses if they held incomplete or inadequate episodic timings (e.g. recording errors). No specific predictions as to the behaviour of the RNG were made. To maintain ecological validity, none of the watching participants were tested for state-mood or state-arousal, conditions were uncontrolled in the sense that viewers were free to behave unfettered and come and go at their leisure.

Intention

As an exploratory study, the aim was to examine whether the observance of matches would generate anomalous RNG activity. As such, would certain factors (such as boredom, excitement, anxiety etc) facilitate these anomalies? Alternatively, would certain events, such as the periods surrounding goal scoring, consistently demonstrate RNG anomaly? Would games that involved favoured nations (e.g. England) or countries whose results impacted upon England's progress show distinction?

Games analysed

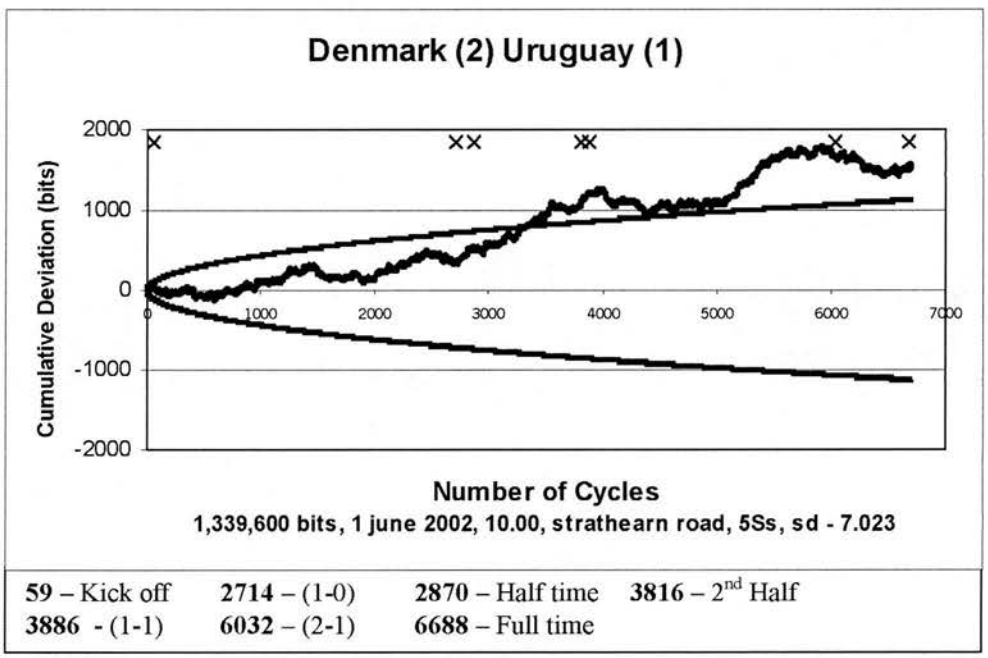
Although 26 televised matches had RNG samples simultaneously taken, 22 were included for detailed analysis as 4 had incomplete or inexact timings.

Results

Both z tests and chi square analyses were carried out. Z tests offer insight into how balanced the trials were, and whether any directional effects are apparent. Chi square indicates anomaly across trials when anomaly operates in changing directions.

Of the 22 episodes, only two exceeded two-tailed chance expectancy: (stouffer z (SZ) of 1.96). These matches were Denmark versus Uruguay (see chart 9.1) which finished 2-1 and was watched by 5 subjects (SZ = 2.693), and Cameroon versus Saudi Arabia which finished 1-0 and was watched by 2 subjects (SZ = -2.006). No obvious reason, in terms of experimenter perception, as to why either of these two matches might prove anomalous can be provided.

Chart 9.1, Denmark versus Uruguay



parabola represent 2-tailed (p)=0.05

Entire episodes.

Each sampled match encompasses the data from the game itself, the half time period and (normally) a short period prior to kick-off, leading (all in) to around 110 minutes of RNG measurement. Table 9.1 provides a synopsis of results when the data from all 22 matches is combined.

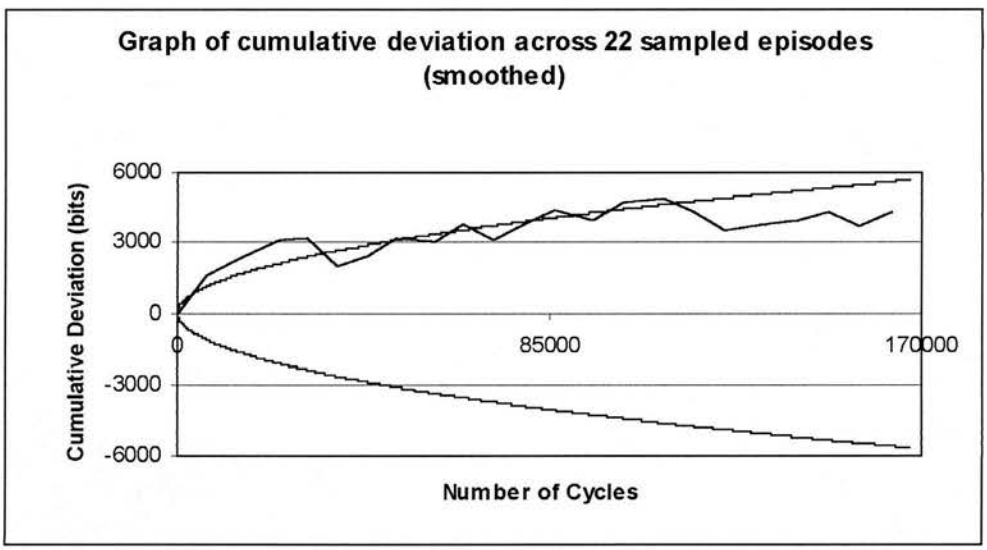
Table 9.1 – All World Cup Scores

World Cup 2002.

Sampled Episodes

Number of Trials	Average number of subjects	Average standard deviation	Number of Cycles (total)	Cumulative Deviation (total)	Terminal SZ score	Number of Goals scored
22	3	7.073	162,954	4,320	1.513	46

Chart 9.2 – Graph of cumulative deviation across sampled episodes



The parabola represent a two tailed p=0.05 level.

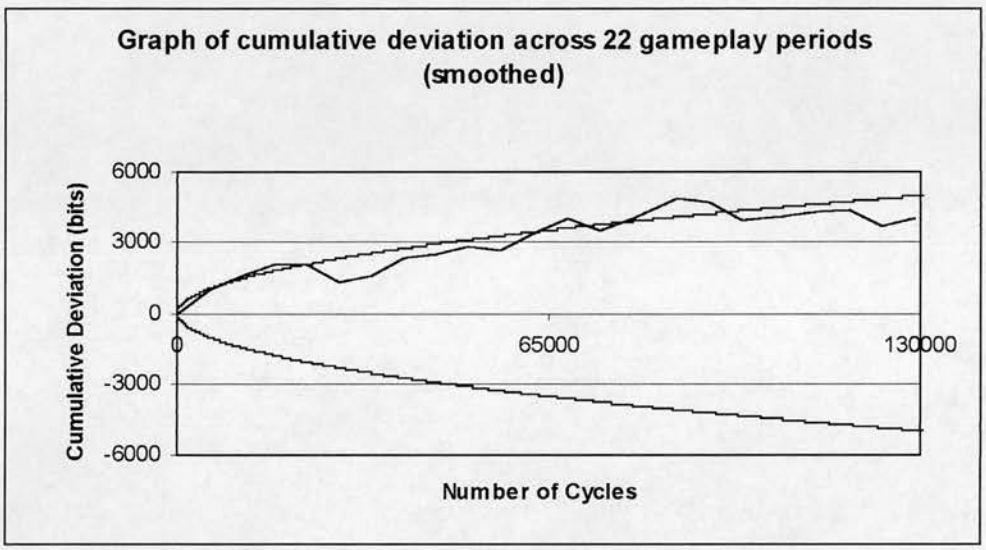
12 of the 22 games showed deviations around or slightly in excess of SZ +/- 1, whilst the terminal cumulative SZ of 1.51 indicates that there was a positive directional trend (more ones than zeros). Chi square analysis returned: $\chi^2 = 28.255$ (d.f. 22) p=0.167 (where each sampled episode was the unit).

Gameplay only (90+ minutes of on-field play)

When game play alone is focussed upon, there was 2 to 1 majority of RNG outputs in the positive direction (15 versus 7). The 22 matches produced a terminal deviation of +4,017 from 129,002 cycles (almost 26 million bits), equating to a SZ of +1.58. Chi Square, $\chi^2 = 21.698$, d.f. 22, p=0.478, reveals that the positive trend emerged from the quantity of positive episodes even though they were not significantly anomalous. Chart 9.3 below shows the cumulative deviation across all 22 analysed

gameplay periods. Similarity between charts 9.2 and 9.3 suggests that gameplay and episodes in general had similar overall profiles.

Chart 9.3 – Graph of cumulative deviation across gameplay periods



Half Time periods

One significant result came from looking at RNG activity during the half time periods. These 15 minute windows normally saw viewers taking a moment to 'switch off' from the game. Little in the way of directional effects were apparent and the cumulative SZ score of –0.168 from 22,364 cycles was low. However, using each half time period as a separate trial, chi square analysis revealed: χ^2 = 39.188, d.f. 22, p=0.013, e.s.= 0.015, suggesting that these periods, unpredictable in terms of direction, were significantly divergent. Results such as this might give credence to the notion that it is change in mental state that propagates RNG anomaly.

Goals.

To examine the effects of goal scoring, 5 minute windows either side of a goal were examined. Although over 40 goals were scored in the 22 matches, 12 had to be precluded from analysis because of confounding variables within the 5 minutes - such as other goals, cessation of play, and penalties.

Table 9.2 – Analysis around goals scored

Goal Period	Chi Square	D.F.	(p) value
Pre-goal	23.664	34	0.908
Post-goal	39.545	34	0.236

Table 9.2 shows the overall behaviour of the RNG around the 34 goals analysed. As can be seen, Chi Square analysis of the five minutes leading up to the scoring of a goal shows very little anomaly, whilst the five minutes following a goal also shows a non-significant effect although a trend for anomaly is more apparent.

Penalties

Analysis surrounding the moment before and after penalty incidents, failed to produce any distinct patterns.

No Goal in First Half

One minor trend that did emerge was with matches that had no goal in the first half, Chi square analysis for these 10 matches (χ^2=14.987, d.f. 10, p=0.13) showed quite sizeable, but non-significant, deviations - as though the expectancy of a goal helped facilitate RNG anomaly.

England's Progress

Attention was also directed towards matches that impacted upon England's progress through the tournament. Of the 4 games directly involving England there was little deviation from chance expectancy (χ^2 = 1.919, d.f .4, p=0.75).

Summary

These results seem to indicate some general themes. Firstly periods of play seem to be characterised by low level directional shifts in RNG activity typically in the positive direction. These shifts are not especially anomalous but become more meaningful when games are summed, and a trend (albeit non-significant) becomes visible. Secondly, half time periods where people are not attending to any match

play, are represented by anomalous outputs without directional properties. Positive periods appear to cancel out negative ones and it is only through an analysis of variance that an effect appears.

Experimenter Speculation

Referring to the literature mentioned in the introduction, there was little high level affiliation with any team except England during the course of these trials. It may be expected on the basis of the literature that England games would have the most impact, in terms of identity and ego, upon the viewing group - yet these matches showed very little in the way of anomaly (terminal SZs of 0.966, 0.352, -0.925 & 0.310 gameplay periods). The general mood within the viewing groups during these periods could be accurately characterised as 'anxious', since any defeat would ostensibly end England's world cup run.

Aside from England's matches, 18 further games were watched and sampled, and I would summarise that interest mostly surrounded the on-field quality of gameplay and not (particularly) the match outcome. Thus there is a comparative shift between England matches where victory was the prime objective and the other 18 where quality counted more.

The significant anomalies from half time periods coincided with a change in viewer focus from the match onscreen towards seeking refreshments, going to the bathroom, conversing with other viewers. It may be that mind-matter interactions, during half times, are synonymous with release of effort effects (e.g. Stanford & Fox 1975, Palmer & Kramer 1987). In turn the non-significant trend that arose in the absence of a first half goal could be broadly epitomised as a period of frustration, since match quality was normally considered low.

Part 2: Other Football matches.

Methodology

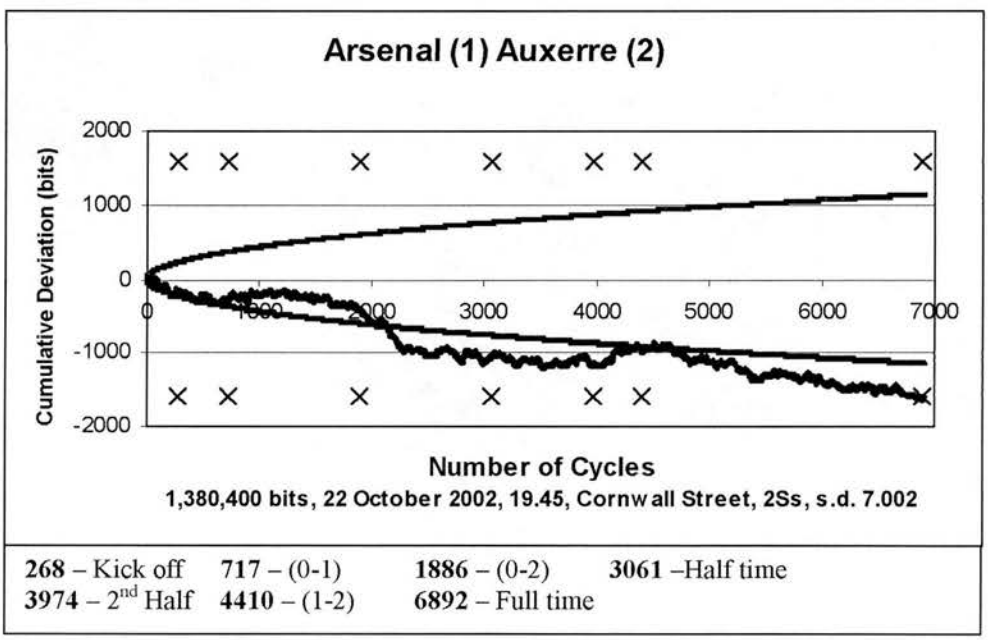
As per World Cup sampling.

N.B. samples taken after 1 August 2002, were at a different location, as the experimenter had moved premises.

Results

In addition to the World Cup, 38 further televised football matches were sampled over a twenty-four month period. Of these, 4 matches were in excess of SZ +/-1.96, and a further 4 in excess of +/-1.645. Beneath (Chart 9.4) is an example of an episode (including buildup and half time periods) taken from a European Cup match, along with timings for each important moment in the game. The terminal deviation was highly significant (stouffer z = -2.75).

Chart 9.4 – Denmark versus Uruguay – RNG output (parabola: 2-tailed 0.05 level)



Entire episodes

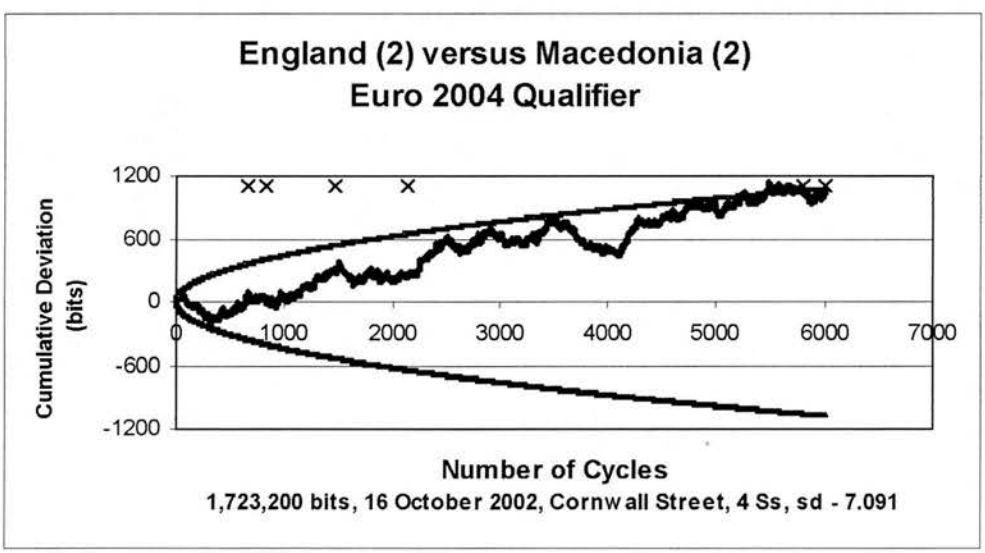
For all 38 match episodes, 18 trials operated above mean chance expectancy and 20 operated below, indicating no directional effects. A chi square analysis of variance, across all trials, returned χ^2 = 56.889, d.f. 38, p=0.025, e.s. = 0.0037.

Game Play (90+ minutes of on-field play)

Summing the 38 games resulted in a terminal cumulative deviation of just +930 bits, failing to indicate any directional effects. However Chi square showed that the dataset as a whole was significantly anomalous: χ^2 = 53.857, d.f. 38, p=0.046.

Chart 9.5 provides an example of an anomalous gameplay sample involving England and Macedonia in an European Championship qualifying game, where match build-up and the half time period have been removed:

Chart 9.5 – England versus Macedonia, RNG output



Halftime periods

Unlike the World Cup data there was no anomaly prevalent during the half time period. 33 matches were included for analysis, with 5 matches precluded because of incomplete timings, these matches revealed: χ^2 = 29.189, d.f. 33, p=0.657.

Goals

No significant anomaly centred around the five minutes prior to, or after a goal was scored.

No goals first half

9 games were sampled that had no goal scored during the first half, analysis revealed $\chi^2 = 5.104$, d.f. 9, p=0.825, showing no significant effect.

Penalties

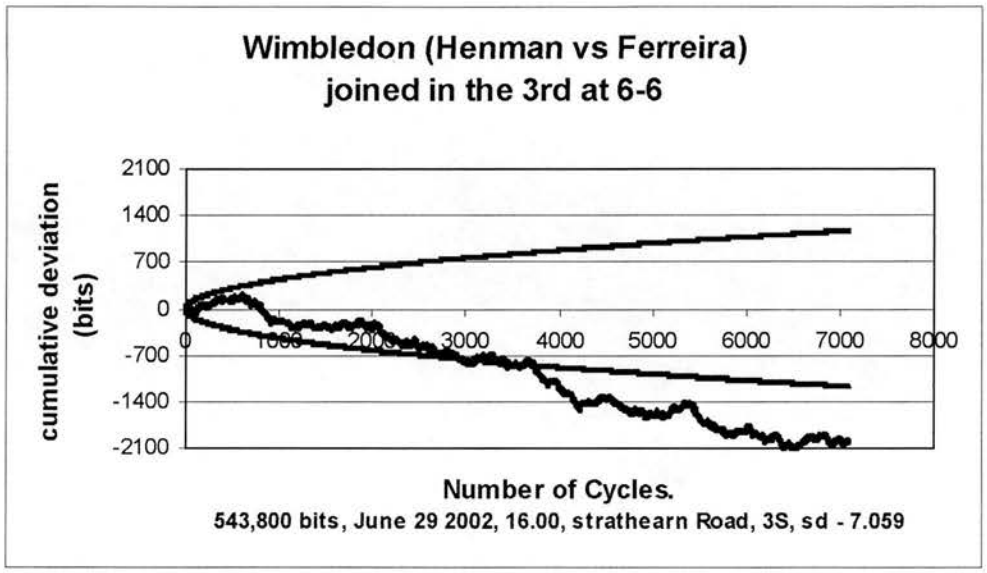
Once again, no anomaly emerged around penalty incidents, either prior to, or after, a penalty attempt. Furthermore, successful penalty attempts showed no post-event RNG anomaly.

Part 3: Other.

Further RNG trials were recorded during televised highlights of football matches to examine whether any time effects were at play. Under the same protocol as 'live' games, the RNG was activated to sample alongside programme transmission. Once again the experimenter was responsible for recording important moments and for operating the measuring equipment. Of the 5 episodes, 1 culminated in a terminal stouffer z of –1.79, although Chi square revealed no overall anomaly: $\chi^2 = 4.353$, d.f. 5, p=0.500.

Alongside the football trials, 2 rugby matches and 1 tennis match (below) were sampled. The tennis match data was gathered serendipitously and originates in the middle of a Tim Henman/Wayne Ferreira game (6-6 in the third set). It is included because the 3 viewers agreed afterwards that it was amongst the most exciting tennis they had witnessed. The terminal SZ was –2.09.

Chart 9.6 – Wimbledon match – RNG output



The two rugby matches sampled, both involving England, were investigated under the same protocol as the football matches. This meant that the sample of subjects was a convenience one, the experimenter recorded the timing of important moments (whilst blind to the RNG output) and the sampling took place within his residence. Both matches failed to exhibit any significant anomaly.

Part 2: Summary

The sampling of non-world cup football matches demonstrated significant anomaly during gameplay periods and episodes as a whole.

Experimenter Speculation

Unlike the world cup data which saw the majority of matches not involving teams which viewers had much allegiance to, the matches included for analysis here all involved teams that the viewers had a strong affiliation for. This affiliation saw viewers supporting the 'home teams' but not the extent that defeat was catastrophic (as most games were under a league format). As such the significant chi square value ($p=0.025$) may represent some form of unconscious desire to win allied to reduced levels of anxiety (because of the competition format).

Chapter Discussion

To assist this discussion table 9.3 provides a synopsis of the data pattern for the 4 primary analyses between world cup and part 2 football data.

Table 9.3 - Results synopsis

	World Cup		Part 2 data	
	cumulative SZ	chi square (p)	cumulative SZ	chi square (p)
entire episode	1.51	0.17	-0.47	0.025
gameplay only	1.58	0.48	-0.17	0.046
half time periods	-0.17	0.01	-0.63	0.657
no goal first half	-0.69	0.13	1.21	0.825

all data based on maximum number of calculable trials

Significant results were achieved for World Cup data and Part 2 data, in different places. With World Cup games, anomaly was evident during half time periods, whilst Part 2 matches showed an overall deviation from chance expectancy for episodic and game play periods. From the subjective position of experimenter and system operator, no stand out explanation as to why this dichotomy exists, although speculation has been broached that most of the World Cup games were not meaningful in the same way or places, that the games from Part 2 were.

It may be that 'meaningfulness' is indeed the single most important factor in generating any mind-matter interaction. Due to the individual differences between viewers in allegiance, interest, belief and (probably) PK abilities; future experiments may need to abandon group field trials in favour of segregated 'RNG-Subject' measures, where the true state of the subject can be accurately gauged. It may be that putting together groups of viewers with their differing takes on any perceptual episode creates a source of mind-matter confound inhibiting any anomalous effects, although some might argue that there should be an additive effect with similarly focussed individuals. Whatever the case, it is worth reconsidering the words of Hirt et al (1992) *" ... supporters of the same team who differ in level of identification also see different games."* p789. As discussed in the introductory chapter, anxiety seems to prove PK inhibitive, and game anxiety may prove the biggest hurdle to overcome with high allegiance sports fans.

Interestingly, no anomalies were found around moments of goals or penalties, rather it was longer scale periods (such as the episode as a whole) that seemed to provide the strongest anomalies. This might give some credence to the idea that the outcome (and a meaningful outcome at that) is of most importance to the viewer and not necessarily the means of getting there.

The breakdown of games into their component parts such as gameplay, halftime etc certainly raises the issue of multiple analysis once again. Nonetheless to generate any kind of understanding of the particular elements to a sports match, such a procedure could not be avoided. Without such an approach, only the experimental episode as a whole could be analysed and all the potentially illuminating data surrounding certain periods would have to discarded in favour of a single measure.

Mention was made in the earlier thesis chapters as to the importance of the operator's mental state. With these trials, the author acted a system operator and in my judgement, the *expectation* I held towards particular sporting events showed no correlation with the RNG's behaviour. If, for example, I watched a match in an expectant state, no specific pattern emerged from the data compared with, say, non-expectant or disinterested or hopeful moods.

Results from this chapter illustrate that sporting matches can facilitate apparent mind-matter interactions. The next stage for researchers is to try and explain why certain episodes are anomalous and others (e.g. Nelson et al, gridiron games 1998) are not. This may involve reducing the naturalness of the situation in favour of repeated measure mood samples, or in using selected populations. As well as sporting events, a variety of alternative environments might suggest themselves as PK conducive. Thus the next chapter looks at some of these situations where passive RNG measures might exhibit anomaly.

The previous chapter utilised passive RNG measurements taken whilst viewers watched televised sports matches. The idea that randomness might be passively affected across various scenarios requires further consideration and the following three studies attempt to examine that perspective.

FieldREG Part 2: Physical Activity

In 1972, Charles Honorton and Warren Barksdale published a paper detailing 3 exploratory PK studies examining whether PK functioning could be boosted when subjects engaged in the tensing of their muscles.

Figure 10.1 – Honorton & Barksdale's Experimental Design

Muscle Tension	*Relaxation*
Active Concentration **20 runs**	Active Concentration **20 runs**
Passive Concentration **20 runs**	Passive Concentration **20 runs**

In the first batch of trials, Honorton and Barksdale used 6 subjects from an adult education class, and investigated whether a group PK effect could be created as per the design in table 10.1 (above). PK success was measured by successfully illuminating one of a randomly selected pair of lamps. Under the active concentration protocol, there was a deliberate effort to light the target, whilst passive concentration involved observing the lamp light up, but not seeking to influence it. Each condition was run in a block of 5 trials.

To assist subjects into tensing their muscles, they were advised: *"...Hold your right arm straight out in front of you, pointed directly at the PK machine. Concentrate your entire attention on your arm. Your arm is becoming stiff and rigid. Stiff and rigid! Stiff and rigid!..."* p209. Conversely the relaxation condition saw the researchers direct subjects to: *"...Let all of the muscles in your body relax... Relax completely... completely... Take another deep breath... Relax"* p210

As table 10.2 reveals, Honorton and Barksdale found an overall significance to the muscle tension condition, although the majority of the anomaly came from the passive concentration condition.

Table 10.2 – Results (adapted from the journal article)

Muscle Tension	*Relaxation*
Active Concentration **+9 (non significant)**	Active Concentration **+9 (non significant)**
Passive Concentration **+27 (p<0.002)**	Passive Concentration **-7 (non significant)**
Overall **+36 (p<0.005)**	Overall **+2 (non significant)**

According to the report, it would seem that Charles Honorton's role in this set of trials was to announce which of the lamps was the target and then activate the RNG. It would seem logical to surmise that he was privy to the RNG's output and may have been a primary source of anomaly. Barksdale's role during this experiment is not listed, and it would therefore appear that he remained outside the test area.

In the second study, subjects were tested individually instead of as a group. 10 participants took part under the same protocols as study one, but completed 10 sixteen-trial runs for each condition. Interestingly Warren Barksdale was system operator for this study and no significant effects were obtained under any condition. One point to consider is that Warren Barksdale was black and since testing took place in the early seventies, one might question whether white subjects consciously or unconsciously modified both their psi and non-psi behaviours.

One final experiment saw Barksdale remaining as experimenter but Honorton acting as the single subject. Only 2 conditions were employed: muscle tension and relaxation, (the active and passive concentration conditions being removed). The tension condition yielded a highly significant positive deviation ($p<0.00005$), and the relaxation condition yielded a significant negative deviation ($p<0.0005$). The remarkable results of this experiment (especially when taken in conjunction with study one), might be seen as pointing towards Honorton generating a sizeable experimenter effect. More so when one considers that the two significant studies involved Charles Honorton in arrangements that permitted real time feedback and/or effects. Some might argue that Honorton's experimental career

was especially successful in the generation of positive results, so one must ask whether the muscle tension format was responsible for a PK effect or whether it was Honorton's particular abilities (and beliefs) that facilitated anomaly.

Assuming however that there is some linkage between physiological state and PK functioning (via consciousness or not), it would be useful to examine whether muscle tension and RNG anomaly are linked. To test this concept an exploratory study was carried out that used the author as both system operator and subject, and looked at how short intense exercise would effect a proximally placed RNG. No effort was made to overtly influence the RNG, nor was any feedback provided until all trials had been completed, the protocol should thus be considered passive. Since much discussion has been made as to the importance of experimenter belief, it should be stated that pre-experiment I held scepticism as to the validity of the approach.

Methodology

Location

Fortuitously, a location was available to the subject/experimenter that was physically isolated in the Gloucestershire countryside, by some 200m, from any other inhabited properties. Discussion has been made previously as to the potential confounds that even unconscious individuals might generate if physically close to the RNG (e.g. in a multi-story building – the floors above and below), thus the opportunity to carry out a program that minimised immediate proximity was considered highly beneficial.

Apparatus

Because RNGs are fundamentally non-portable whilst sampling, any muscle exertion research had to take place within a fixed area. The most obvious means of confining movement was to use exercise equipment that was stationary. Thus, a NordicTrack Ellipse was employed, which used elliptical struts to simultaneously exercise arms and legs aerobically.

Procedure

The RNG was placed 4 feet from the NordicTrack and was activated by the author prior to the start of exercise. A 10 second lag enabled the author to commence the exercise program before the sampling began. A 10 minute timer began to count down on the NordicTrack's console once exercise had began and kept the author advised on the remaining period of exercise. During testing, no other individuals were made aware of the study.

The RNG

The Orion RNG, sampled at c. 200 bits per second. 10 ten-minute trials were carried out, totalling 6,000 cycles (1.2 million bits).

Hypothesis

Due to the exploratory nature of the study, no formal hypothesis was offered pre-experiment. However, analysis was planned to examine whether the RNG's output anomalously deviated from mean chance expectancy during the exercise periods.

Results

Table 10.3 – Results Table

Single S, over 2 months
(* signif <0.05)

trial	cycles	z	one tail	two tail
1	600	-0.075		
2	600	-1.286		
3	600	-2.375	*	*
4	600	1.112		
5	600	-0.174		
6	600	1.031		
7	600	-1.106		
8	600	-1.686	*	
9	600	0.000		
10	600	-0.434		
all	6000	-1.579		

Table 10.3 (left) shows the results from the 10 trials. Only trial 3 exceeded two tailed probability - SZ –2.375. Of the ten trials, 7 operated below chance expectancy and one (trial 9) had an exactly equal number of ones and zeros. The terminal SZ for all cumulative data was –1.579, which equates to a two tailed probability of 0.11. A Chi square analysis revealed no significant variance: χ^2 13.884, d.f. 10, p =0.178.

Discussion

Although a strong negative trend emerged, no significant anomaly emerged from this exercise paradigm. It may well be that any genuine PK effect was constrained by the natural doubt I held towards the approach, and that a more 'open' attitude could yield stronger results. From a future research perspective, the use of physiological arousal, emotional arousal and RNGs may offer much – emotional responses might be heightened by physically animating the subject, and boosting the hormonal and neurochemical levels that co-associate between exercise and heightened mood state (e.g. adrenaline). Alternatively, the use of nourishment that generates predictable physiological responses (e.g. chocolate/serotonin) could also be employed.

The main concern with results surrounding physical arousal is that there is no understanding of the cognitions the subject experienced whilst exercising. With the 10 trials mentioned above, there was no uniform perceptual feeling. Indeed as the trials were carried out – thoughts, expectations and foci all varied. If one draws comparisons with Honorton and Barksdale's data (and assumes anomaly stemmed from the participants and not the experimenters), it may be that the muscle tension format simply facilitated a positive mental state: i.e. "*if you do this, your PK will increase*". Comparisons between experiments can only be considered speculative as the environmental conditions between studies were very different. Honorton and Barksdale's study took place under the observation of experimenters, used multiple subjects in unfamiliar surroundings, and used both an active influencing protocol and feedback. My experiment was in familiar circumstances, was unobserved and used a passive measuring protocol with no feedback. Nonetheless, the triad of mind, body and psi is an area that requires further formal investigation. Greater attention would need to be paid towards quantifying measures for mental and physical states, but such an approach might be of value in future studies.

Competitive computer games.

Competitive environments might offer the researcher fruitful avenues of investigation. From an evolutionary perspective, competition is an important behavioural modifier, whereby success typically involves inflicting costs upon a rival. One might therefore infer that a meaningfully competitive situation could 'unlock' any latent psi abilities, as competitors seek to maximise any advantage they hold. One would have to ensure that the competition was authentic enough to provoke a genuine competitive urge, but assuming that was achieved, PK might increase as individuals try to manipulate situations to their advantage, either passively or via a suitable psi model (e.g. PMIR). Under some circumstances, the presence of an actual rival may be unnecessary, subjects might be induced to compete for status, in the eyes of the experimenter or for themselves. In seeking to preserve the ecological validity of any real world measurements, specific instructions should not be provided to participants pre-experiment, yet some means of low level control over the situation might maximise PK, specifically strategies of 'dispassionate effort' should be sought. As considered in chapter one, previous research from Debes & Morris (1982), White (1964), and Faithorn et al. (1988) all suggested that conspicuous attempts to facilitate PK were inhibitive and that the optimal approach was a state of relaxed effort. Thus the experimenter may seek some suitably subtle means of ensuring that trials do not become overly 'frantic' (e.g. through rest breaks).

Debes & Morris concluded that non-striving strategies were beneficial in PK scoring on the basis of their 1982 study. The researchers asked 32 undergraduate subjects to influence the random path of an RNG output. Feedback was provided by a graphical display which showed the RNG output in terms of a target trail that moved from the top to the bottom of the screen. The generation of ones and zeros, derived from a zener diode source, moved the random trail to the left or right of a centre line. Two primary conditions were employed: a striving condition, where subjects tried to force the computer to deviate from mean chance expectancy as much as possible; and a non-striving condition, where they were asked not to try too hard, rather to 'co-operate' with the computer in shifting the target trail. The non-striving group produced a mean hit rate of 96.94 compared to a m.c.e. value of 96, whilst the striving group achieved 95.22. Debes and Morris thus concluded that trying too hard might prove inhibitive, whilst less striving approaches were facilitative.

Several other experiments have been carried out that examined PK functioning under *apparently* competitive conditions: James Crandall (1993) utilised a 'space invaders' style game where the aim was to shoot and destroy incoming aliens. The game made use of an embedded RNG that influenced the firing rate of a cannon such that the faster it shot, the more invaders could be defeated. Cash prizes were offered to the three top scoring participants from a test population of 31. Crandall had subjects take part in 2 trials, the first of which was presented as a practice run with a score that did not count towards the prizes. In the second condition, the score did count. The first 'relaxed' condition resulted in an overall z of -0.36, whilst the 'test' condition was 0.25; neither of these were independently significant, however comparison between the relaxed and test conditions, showed individuals in the relaxed state scored significantly better than during the competitive/test condition. Additional analyses showed a negative but non-significant correlation between extroversion and PK scoring, and no significance between state anxiety and PK scoring.

Broughton & Perlstrom (1986) used a computerised dice game that was ostensibly a modified version of the game 'Oink'. An embedded RNG was used to influence the fall of 15 electronic dice, that subjects rolled in each of 10 trials. The rules stated that participants needed to get as high a score as possible whilst avoiding doubles. Subjects were measured under two conditions, a non-competitive condition with no opponent, and a competitive one, which *appeared* to be against a distantly located individual from a rival university. In actuality, the opponent was a computer simulation. Broughton & Perlstrom found no overall PK effect but did find that state anxiety negatively correlated with PK scoring in the competitive condition.

In a follow up experiment, carried out in the same year but published in 1992, the authors found once again that game scores decreased as state anxiety increased, but did not find significant differences in scoring between the competitive and non-competitive conditions.

In 1990, George Hansen looked at subject co-operation and competition in a 'computerised horse race'. Hansen wanted to examine whether PK was additive and used pairs of secluded subjects to randomly select envelopes that corresponded to potential race winners (4 horses). In the first condition, the two participants chose different horses and were asked to will theirs to victory. In the second condition, and

unbeknownst to one another, the selection was rigged so that each participant selected the same horse, creating a twin influence upon a single outcome. No significant effects were found, although as trends, the co-operative condition was above mean chance expectancy and the competitive condition, below.

The main problem across these cited experiments is whether the conditions were meaningfully competitive, after all being asked to influence a computer simulation might seem inconceivable to many people or artificial to others. Real competition typically involves overcoming a bone fide competitor, thus, one may query whether PK trials centred around altering embedded RNGs (regardless of the prize) is competition in its authentic sense. Surely a competitive environment where an abstract high score measures success, cannot compare to a situational one-on-one match-up with real-time feedback? Even Hansen's study, which superficially looks like competition, is more about defeating a computer system not a living opponent. It may be that defeated individuals attribute success or failure to the machine and not the PK of the opponent. Broughton & Perlstrom's study also suffers because success is defined by good fortune on an apparent game of chance, so although motivation might be high, success and failure can always be attributed to external factors.

Therefore, what needs to be looked at is competition without the chance element, avoiding embedded RNGs within esoteric games. Rather, an RNG could be used to passively measure the outcome of a real competition where ability is the defining factor. Such a game might be Chess or checkers, games where no dice or chance element *should* impact upon the outcome, where victory is typically the result of aptitude. Maybe subconscious PK becomes manifest through a genuine desire to win (and defeat the opposition), and more visible as the competition's intensity increases.

To investigate a truly competitive scenario, I conducted 3 exploratory experiments that used computer based first-person combat games. These games involve high resolution graphics to create a semi-realistic gaming environment. The combat element involves controlling an individual character to defeat either a computerised opposition or a human controlled one. The games are rule based, such that actions always have predictable outcomes, i.e. success is dependent upon ability and not a random process. Other benefits included a lack of turn-taking - the play is always 'on', and that the gaming environment is more vivid and visceral than would be achieved through board or dice based games.

Methodology

Participants

Up to 2 subjects (one of whom was always the author and system operator) were used. The 2nd subject was a researcher in Human Computer Interactions at Napier University and a friend to the author. Both participants were aware of the purpose of the RNG but did not seek to consciously influence it. In fact the only explicit goal was defeating the opponent within the game. Both subjects were similarly matched for ability.

Apparatus

Two games consoles were used, a Nintendo N64 and a Microsoft X-box. The commercially available games titles of 'Perfect Dark' and 'Halo' were the test software.

The RNG

Normal sampling procedures were employed. The subjects remained entirely blind to the RNG output during sampling.

Experiment 1.

Using a single subject design, this experiment examined RNG data as the player progressed through a first-person combat game in solo player mode; success in the game can be defined by the completion of a particular stage, which typically involves journeying through an environment, defeating computer controlled enemy forces. Background RNG measures were taken as the player tried to complete game stages, some successfully, some unsuccessfully.

Experiment 2.

Using the Nintendo console, multiplayer modes were utilised whereby the two participants combated against one another. 11 consecutive trials, each of 10 minutes duration, were carried out in a single experimental session. Victory involved defeating your opponent relatively more times than your own character was defeated, through manipulating the onscreen character. By allowing participants to sit

next to one another, dialogue was encouraged to take place, increasing the competitive edge, but potentially inhibiting, or, facilitating performances.

Experiment 3.

The same basic protocol as experiment 2 except that the Xbox was employed and trials were carried out on non-consecutive occasions over 10 months, and that trials contained multiple games. The same two opponents were involved in all trials. RNG samples were stopped when enthusiasm waned or interruption arose, since the experimenter was blind to the RNG output, he was unable to choose fortuitous times to stop each trial.

Procedure

The experimenter manually activated the RNG, just prior to game commencement.

Participants' pre-experiment view

Analyses were to primarily incorporate z tests and chi square. The experimenter was conducive to the idea that meaningfully competitive computer gaming would catalyse PK production, and the opponent (also aware of the RNG's purpose) was similarly open to the idea that anomaly could stem from the gaming process.

Results.

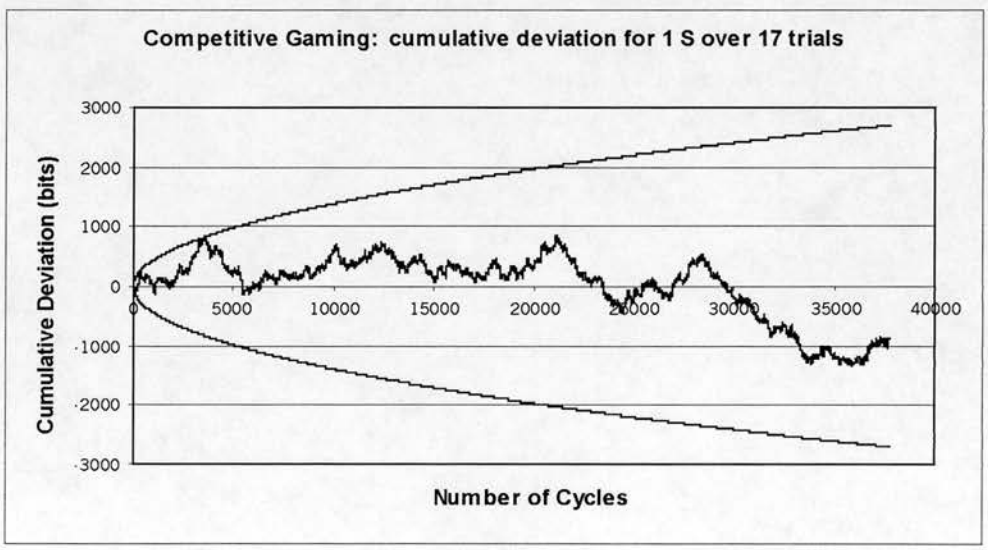
N.B. For single trials, one tail significance (*) should only be considered indicative of trend.

Table 10.4 – Results to experiment 1

Single S, over 4 months (* signif <0.05)					
trial	cycles	s.d	z	one tail	two tail
1	814	7.185	0.707		
2	2050	7.100	0.759		
3	1422	7.070	0.634		
4	2718	7.115	-1.065		
5	1297	7.150	0.117		
6	733	7.109	-0.021		
7	827	6.901	1.638		
8	1083	7.047	-0.315		
9	1855	6.899	0.535		
10	7585	7.171	0.026		
11	3815	7.034	-2.012	*	*
12	1827	7.205	0.786		
13	2830	7.121	0.694		
14	3543	7.032	-2.150	*	*
15	1722	7.311	-1.714	*	
16	1737	7.022	-0.427		
17	1871	7.093	1.333		
all	37729	7.102	-0.6444		

(Table 10.4) The results of over seven and a half million bits, collected from 17 trials over 4 months. 10 trials ended in the positive direction, 7 in the negative. Two trials were independently significant at the 0.05 level (two tail), both operating in the negative direction. Overall the terminal SZ was -0.644 and when the direction is ignored the average SZ per trial is +/- 0.878 away from mean chance expectancy. Chi square analysis revealed no significant anomaly: χ^2 = 20.363, 17 df, p=0.256.

Chart 10.1 - cumulative deviation across all trials.



Experiment 2

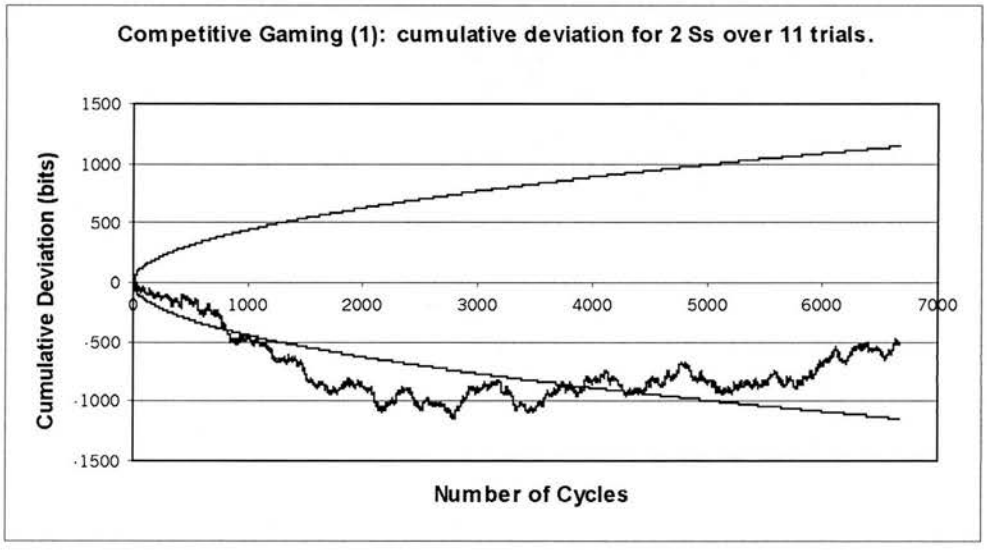
Table 10.5 – Results to experiment 2

2 Ss, over 1 session (* signif <0.05)					
trial	cycles	s.d	z	one tail	two tail
1	608	7.239	-1.524		
2	607	7.199	-1.894	*	
3	608	6.951	-1.494		
4	605	6.973	-0.356		
5	608	7.280	0.123		
6	600	6.709	-0.396		
7	610	7.509	0.518		
8	602	6.990	0.880		
9	604	7.434	-0.711		
10	606	7.534	1.105		
11	603	6.864	0.777		
all	6661	7.159	-0.8814		

Experiment 2's results, (Table 10.5) 2 subjects over 11 consecutive trials, where each trial had only one winner, and can thus be considered equivalent to a single contest. Only 1 approached independent significance. In combining the data, once again a negative, but non-significant overall trend appeared, represented by the terminal z of –0.88.

Ignoring direction, the average SZ deviation (per trial) was +/- 0.889, and Chi square analysis revealed $\chi^2 = 11.815$, 11 df, p=0.377.

Chart 10.2 Cumulative deviation across trials.



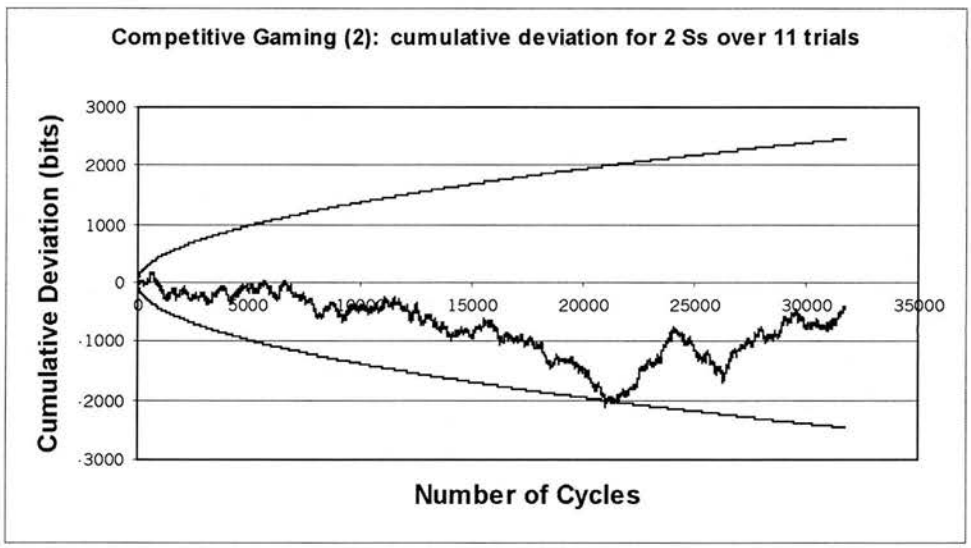
Experiment 3

Table 10.6 – Results to experiment 3

2 Ss, over 10 months (* signif <0.05)					
trial	cycles	s.d	z	one tail	two tail
1	4436	7.008	-0.407		
2	2272	6.975	0.433		
3	2238	6.982	-1.338		
4	1629	7.114	0.003		
5	10530	7.006	-2.142	*	*
6	2451	6.995	2.322	*	*
7	1655	7.038	-0.332		
8	4217	7.176	1.657	*	
9	2272	7.206	0.309		
all	31700	7.046998	-0.3507		

Table 10.6 from experiment 3. Using the same 2 subjects as experiment 2. Of the 9 trials two were statistically significant at the two-tail level, although in both positive and negative directions. Average SZ when sign is dropped is z = +/- 0.9936, whilst chi square is $\chi^2 = 15.071$, 9 df, p=0.089.

Chart 10.3 – Cumulative Deviation across trials.



Combining the results

Table 10.7 - Summary of the research.

Experiment	Cycles	Terminal SZ	S.D.	Chi Square	D.F.	p value
1	37,729	-0.64	7.102	20.363	17	0.26
2	6,661	-0.88	7.159	11.815	11	0.38
3	31,700	-0.35	7.046	15.071	9	0.09
2 and 3	38,361	-0.69	7.067	22.887	20	0.14
1, 2 and 3	76,090	-0.94	7.084	47.249	37	0.12

Discussion

Post-hoc discussion between the experimenter and second subject suggests that competitive gaming trials offer a viable means of heightening competitive urges and manipulating mood states. As the technology becomes more viable – immersive, photo-realistic environments should help produce meaningful and potent environments to stimulate subjects. In the same way that Charles Tart's psychomanteum can help facilitate alternate states of consciousness, I would propose that enclosed, sensory depriving, surround-screen chambers might do the same but enable the experimenter to control suitable stimuli and adapt the situation via real time feedback, according to specific needs. The question of whether to embed RNGs or use them as passive measures might be overcome by employing both approaches per trial. Any similarity or dissimilarity between the two might reveal the focus of any PK functioning.

Sleep and Dream states

Throughout this thesis, attention has been directed towards the use of passive RNG measuring protocols that would seem to be measuring unconscious subject (and experimenter?) PK. As such, it seemed logical that some effort should be given over to looking at psi effects under entirely unconscious circumstances, circumstances that point towards the 'natural state' of sleep.

Sleep is characterised by distinct stages that repeat throughout the night in roughly 90 minute cycles. As the individual falls asleep and becomes drowsy (stage 1) there is a reduction in alpha rhythm from 10Hz to around 8Hz alongside an overall reduction of amplitude. As the stages continue, the frequency and amplitude both continue to slow towards theta waves (4-7Hz) and get interspersed by short active moments known as 'sleep spindles'.

These spindles last for a couple of seconds and see heightened (13-15Hz) EEG activity. The REM sleep associated with dreaming is the fifth stage of the cycle and is caused by a release of acetylcholine. It usually lasts for around 15 minutes. The REM period increases in length throughout the night and the final REM cycle may last up to an hour. Physiologically, REM sleep and dreaming are characterised by activity in the pons, frontal lobes and the perceptual system combining occipital, parietal and temporal lobes; the motor cortex is pretty much inactive, as the sleeper is physically paralysed beneath the neck.

ESP

The ESP literature showcases a long history of using sleep as a state conducive to precognition and clairvoyance, with dreams viewed as potential vehicles for information transfer. Sherwood et al (2002), for example, tested three subjects and asked them to use a majority vote technique in ranking target pictures against dream mentations. The results were non-significant. In a slightly later study (Roe et al 2002) from the same laboratory, a similar majority vote/consensus judging protocol was used with dynamic targets, to test clairvoyance. Once again non-significant results were found. Target factors including emotionality were not found to co-vary, but the lack of effect makes this unsurprising.

In 1999, Dalton, Steinkamp & Sherwood served as experimenters and subjects in a 32 trial dream-ESP experiment. The sleep and dream periods for each experimenter took place within their home

residences. During the night (usually around 3am) a dynamic video clip was randomly selected by a computer system within the Koestler laboratory. This clip was then played a predetermined number of times (roughly 20), but no output was made to either a television or speakers; (i.e. the selected clip was read by the video player but not displayed). The next morning the researchers sat down and watched 4 clips, one target and three decoys. Following this, subjects ranked the clips so that scores matched how closely the clips were to the dream mentation from the previous night. Once this had been completed, the researchers formed a consensus vote based on their scores. If the target clip was correctly identified (1/4 chance) then this was marked as a hit, if it was not (3/4 chance) this was marked as a miss. The results indicated a 47% hit rate, equivalent to a p value of 0.006.

In a single subject study, where the experimenter served as participant, Fernando de Pablos (1998), analysed 223 of his own dreams for precognitive content. 23 of the dreams were deemed precognitive in relation to previously set criteria and of these, 14 occurred within 24 hours of the dream. Interestingly, de Pablos refers to over half of the precognitive episodes as being 'anxiety provoking'. Despite the use of previously set criteria, the protocol was not blind and the reader must treat these results with caution.

In a separate single subject experiment, Trevor Harley (1989) carried out 20 dream sessions and compared them against 4 target pictures from a pool of 200. Overall Harley reported a psi missing effect. In addition, Arthur Bleksley (1963) found a significant effect when his subject was instructed to awaken, during the night, in synch with the minute hand of a randomly set clock.

In a study of sleep telepathy, Krippner & Ullman (1969) tested a single subject over an eight night period. At the onset of the subject's REM sleep, a researcher would attempt to telepathically transmit a randomly selected target art print. Once the subject had completed his REM stage, he was awoken and asked to report on the dream he had just experienced. These reports were transcribed and judged blindly by 3 judges. The 8 trials revealed a significant agreement between the dream episodes and the content of the art print. Several years later, Krippner, Honorton & Ullman (1972) provided evidence that instead of using the same target over multiple trials, the use of different targets for different sleep episodes could facilitate better telepathic scoring. In 1996, Krippner conducted a pilot experiment

testing a subject who reported out of body experiences, and asked him to attend towards telepathic and clairvoyant targets in the event of an OBE. Results showed that the clairvoyant targets were more successfully attended to than the telepathic ones. Interestingly, on the final night of the study, the subject reported having an OBE, which correlated with EEG measurements of slowed brain wave activity.

Keith Hearne (1981) used emotionally close pairs, to see whether an electric shock applied to one, could be detected and reflected by a change in heart rate of the other, under various conditions, one of which was REM sleep. Results did not support the view. In a similarly conceived experiment, Hearne & Worsley (1977) used emotionally close pairs with a common phobia; by measuring heart rate and eye motility, the presentation of a phobic stimulus to the conscious pair member was measured in the dreaming subject. Once again no significant results were found.

Dream Telepathy studies proved popular during the late 1960s and 1970s due in no small measure to the popularly known research carried out at the Maimonides Medical Centre in New York. Ullman, Krippner and Vaughan (1986) provide insight into the research carried out at Maimonides between 1966 and 1972 and the reader is directed to their book *Dream Telepathy* for a review of the field. In Dean Radin's (1997) book *The Conscious Universe*, a review of the Maimonides data from 1966 to 1973 is provided, Radin reports that the 25 studies of dream telepathy showed an overall hit rate of 63% where chance predicts 50%, although it should be made clear that not all studies were successful. This corresponds to a p value of <0.000001 (p70-72).

It should be borne in mind that target selection for ESP studies always contains the opportunity for PK to influence the procedure, either acting directly upon computer hardware or on researchers themselves. Rex Stanford's (1974) MOBIA model, which stands for 'mental or behavioural influence of an agent', revolves around the concept that an agent can be unconsciously triggered to modify their behaviour or influence a system by PK from another agent.

PK

The Journal of Parapsychology from September 2000, published an article by Helmut Schmidt that purported to indicate a PK effect in a state of pre-sleep. Schmidt's examination of the pre-sleep state is a period synonymous with alpha wave slowing; previous research has suggested that slower waves, facilitated by procedures such as meditation, the Ganzfeld, or controlled breathing might be conducive to psi. The literature for altered states of consciousness and psi is extensive and cannot be done justice here, but in summary and like much parapsychological research – reproducing significant effects has been a problem - Stanford & Stevenson (1972) found that lower frequency alpha waves were conducive to higher ESP scoring, and Honorton (1969) found a positive correlation between alpha rhythm activity and ESP scores (r +.72). In 1979 Rao & Feola conducted a single subject study and found a 0.48 correlation between alpha activity and ESP scoring. Conversely, other research such as Stanford & Stanford (1969) and Stanford & Lovin (1970) failed to find significant correlations.

With regard to the influencing of an RNG, Heseltine (1977) hooked up subjects to an EEG and fooled them into believing that their brain waves, measured by the EEG, could influence the production of high or low tones, which were fedback through headphones. Subjects were told to focus on producing either high or low tones, but the actual mechanism producing the tones was an RNG, the protocol resulted in significant psi hitting for the low tone condition and the author reported that successful psi hitting was associated with alpha activity. A year later Hesletine & Mayer-Oakes (1978) published a study that looked at hemispheric control over an RNG, and reported that RNG deviation was *'primarily associated with alpha activity'*. Further evidence has also suggested that theta waves are associated with psi also, for a review see Healy, 1986.

Much of Helmut Schmidt's previous research (discussed earlier in this thesis), required subjects to focus upon an RNG and influence it; but with the study from 2000, he wrote: *"It seemed interesting, however, to also study the opposite situation* [to volitional effects] *in which the participant was sleepy and was mentally focussed on other things, with the random events happening more at the periphery of consciousness"* (Schmidt 2000, p319)

Schmidt cites the research of Honorton & Barksdale (1972) as well as Braud & Braud (1979) and posited that PK effects might be more accessible when the body is in a very relaxed state.

Schmidt used a weak vibrator attached to his body that generated a signal (via pre-recorded random numbers) roughly every 15 seconds. This signal briefly *'interrupted'* falling asleep, but "*did not appear as a major irritant, and the participant managed to enjoy the extended experience of falling asleep rather than thinking about the next upcoming signal...* ". Schmidt found a significant reduction in signal frequency ($p=0.013$) and also a bunching effect ($p=0.0022$) wherein signals clustered instead of appearing regularly over a period of time.

Ruth Reinsel (1998) carried out an experiment that compared PK performance after REM and non-REM (stage 2) sleep, and tentatively hypothesised that PK scoring would be higher under REM conditions, than stage 2. Thirty subjects, in a dream laboratory were awoken after REM and stage 2 sleep at the beginning of the night and at the end. Having completed cognitive tasks, subjects were asked to influence an RNG system and were provided with feedback as to their success on the task. No significant effects were found between REM and stage 2, nor the time of night when a person was awakened, nor were there any covertly measured release of effort effects. A significant effect was found with female subjects and stage of the night, although in itself little can be deduced.

Although the Maimonides studies show good results, other studies can be considered to show little evidence of psi scoring under sleep paradigms. Yet evidence from the RSPK literature, the FieldREG studies and Stanford, Zenhausern & Dwyer's 1975 study (whereby subjects unconsciously released themselves from unpleasant tasks) amongst others seem to suggest that unconscious PK effects manifest themselves with an awakened source. Perhaps these results lend credence to the idea that there needs to be a further dichotomy when defining mental state. Although seemingly tautological, should we consider *'unconsciously derived unconsciousness'* and *'consciously derived unconsciousness'* as separate entities? If we could assert that unconscious human states such as sleep involved a quietening of all but autonomic activity, then the dichotomy is not required. But unconscious states such as dreaming are active: neurons fire, memories are retrieved, conflicts are resolved. Although qualitatively different from the waking state, unconscious ones are similarly 'busy'. As such, I felt that an experiment was required that looked at whether a proximally placed RNG would be affected by a sleeping individual.

Method

Participants

In this sequence of trials, the experimenter was also the subject. This was done, primarily because of the difficulties involved in setting up a sleep laboratory in terms of cost and available facilities. Furthermore the studies in this chapter seek to take real world measurements and the ecological validity of an alien sleep environment is questionable. The experimenter was sampled whilst sleeping alone.

Background

The trials were carried out in 3 locations, increasing the potentiality of artefact but necessary to raise the power. No other individuals were informed when trials were sampled (minimising conscious 3rd party effects). Obviously, the opportunity exists for there to have been unintentional psi effects from individuals close to the test area, but all efforts were taken to choose suitably restricted times for testing (i.e. property empty except for experimenter, environment quiet etc).

The RNG

Normal RNG procedures were employed, but for this study a lag time was built into the initial activation of the RNG. Sampling was delayed for a 20 minute period, allowing the operator to fall asleep. Sampling commencement was signalled by a tone, and if the experimenter heard this (i.e. was awake) the system was reset. The experimenter was blind to the RNG output until the trial had been completed.

Procedure

The RNG/computer system was placed around 3 feet from the head of the experimenter, and the display deactivated. The RNG was stopped by the experimenter at the end of the sleep period; if the experimenter briefly awoke during the sleep period, the system was allowed to continue sampling. Any period of being awake that was consciously judged to have lasted more than one minute terminated the sampling (although this never happened). At the end of the sleep period, when the author made a conscious decision not to sleep any longer, the sample was also concluded.

Results

Table 10.8 – Results Table

N.B. – One tail significance should only be considered indicative of a trend.

trial	cycles	deviation	Stouffer Z	one tail significance	two tail significance	trial	cycles	deviation	Stouffer Z	one tail significance	two tail significance
1	6,124	74	0.135			23	5,537	-142	-0.273		
2	2,273	790	2.355	*	*	24	17,503	62	0.066		
3	4,952	-336	-0.682			25	14,850	1076	1.249		
4	2,341	-235	-0.668			26	4,204	-552	-1.209		
5	8,773	513	0.773			27	2,305	373	1.138		
6	3,867	-236	-0.536			28	15,660	74	0.083		
7	26,875	35	0.030			29	18,289	-680	-0.712		
8	22,778	-1,399	-1.311			30	25,140	-1345	-1.199		
9	27,581	652	0.555			31	25,811	0	0.000		
10	31,709	2,270	1.818	*		32	19,237	-1123	-1.140		
11	29,708	-268	-0.219			33	26,112	598	0.520		
12	32,624	256	0.200			34	20,765	1566	1.538		
13	27,133	171	0.148			35	4,972	385	0.774		
14	2,051	-101	-0.311			36	18,310	-824	-0.858		
15	4,305	-190	-0.414			37	21,759	252	0.242		
16	3,711	-328	-0.775			38	2,561	-75	-0.215		
17	29,406	494	0.406			39	21,728	-526	-0.504		
18	14,349	1,772	2.105	*	*	40	25,487	-839	-0.743		
19	20,887	-158	-0.155			41	26,477	-2459	-2.121	*	*
20	30,754	1,811	1.458			42	20,902	70	0.068		
21	10,136	-193	-0.270			43	32,220	-1124	-0.877		
22	12,696	1,519	1.910	*		44	25,493	-174	-0.155		

Table 10.8 shows the results from 44 independent trials, totalling over 750,000 cycles (150 million bits). As can be seen, 5 episodes (can be adjudged anomalous, of which 3 were significant at the two-tailed level; chance expectancy at this alpha level would predict 5% of episodes to be significantly anomalous, the figure from this study is 7%. In turn, no directional effects were evident. The cumulative SZ for all trials is +0.246 and a chi square analysis of variance reveals no significant anomaly: χ^2 41.964, 44 d.f., p=0.56.

Chart 10.4 - Cumulative deviation across trials.

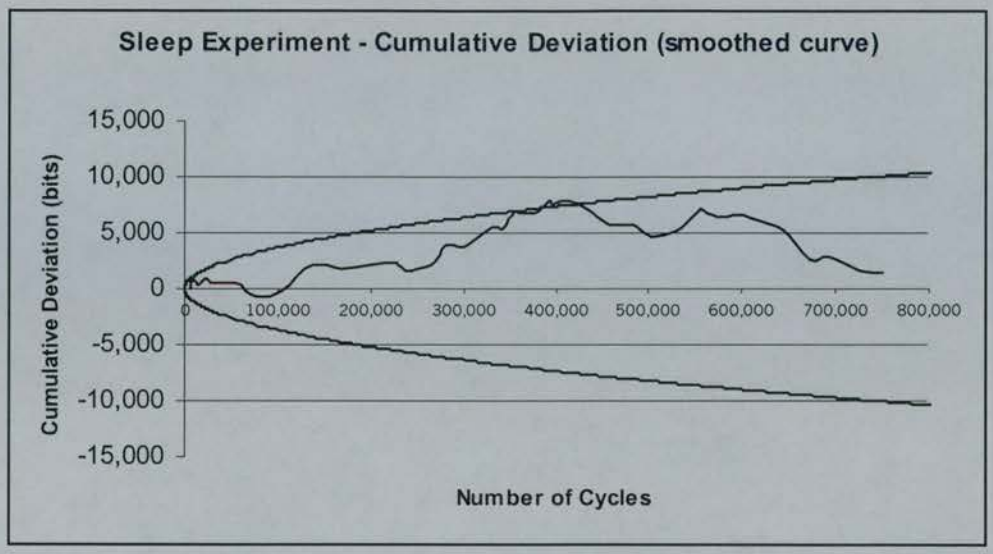


Chart 10.5 – Anomalous Episodes (0.05 one tail or better)

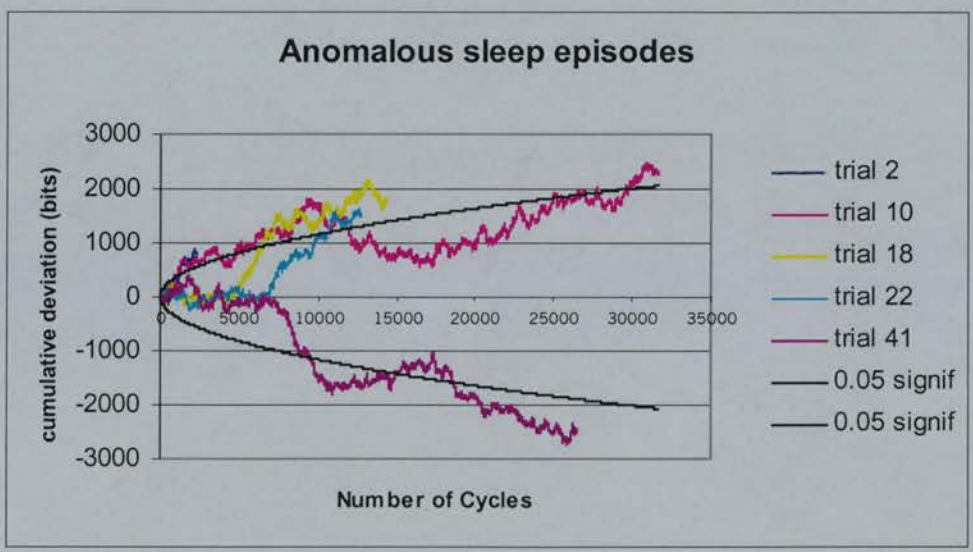


Chart 10.5 shows the cumulative deviation of the 5 trials that exceeded one tailed mean chance expectancy. Trials 18 and 22 and 41 show little in the way of anomaly for thousands of cycles (almost until definite trigger points are reached), wherein a substantial change in direction and gradient occurs.

Discussion

Despite the lack of overall effect, the patterns within the five anomalous sleep episodes are of interest. Of these, three display quite apparent trigger points, after which sizeable anomaly occurs. Might it be that some specific aspect of the sleep cycle prompts such behaviour? Or, are these patterns the result of some specific perceptual experience that the subject has? Alternatively, one might hypothesise that these results are simply due to chance.

Future research would need to employ EEG measurements to compute the stage of sleep any participant is going through; ideally the experiment would be automated so that no third party (experimenters, observers etc) were present, confounding the data. Then the RNG output could be examined alongside distinct sleep stages; after all it may be that stage 1 sleep (as Schmidt demonstrated) has peculiar qualities over latter stages such as REM sleep. Alternatively, REM sleep with its 'active network' state might be the root cause of anomaly, as advocates of quantum models of psi would argue that quantum collapse might occur around any neuronal firing, regardless of consciousness state.

In the introduction, the question of whether unconsciousness needs to sub-divided into consciously and unconsciously derived components was raised. Although the results here do not support the idea that truly unconscious PK interactions occur, they hardly dampen such a view. Whilst some might argue that the anomalous episodes were a result of normal (uninfluenced) random processing, others might suggest that the 5 episodes were a causal result of PK, and that the lack of consistency across trials is once again testament to psi's elusiveness. After all, it may bet that these irregular datasets being exceptions to the norm, only occur under highly specific circumstances – circumstances that these trials cannot illuminate.

Evidence suggesting that emotion can in some way facilitate psi phenomena raises various questions. How does psi integrate with emotion? What about cognition? Can researchers now make *a priori* predictions as to when and where psi phenomena might take place?

Some might argue that emotion seems to present a quandary, in that PK experiments benefit from heightened emotional states whilst ESP experiments use protocols such as the Ganzfeld, to quieten the mind, dampening extraneous 'noise' (i.e. a heightened emotional state may not be conducive to ESP). Before continuing, it is worth considering how these two capacities might coexist. In doing so, one can consider the metaphor of a telephone conversation. Whilst on the telephone, speaking *and* listening at the same time makes communication difficult. To avoid this the protocol is for turn taking, and it may be the same with anomalous information transfers. A quietened mind aids in receiving information (noise reduction model). When sending information (or generating anomaly in the RNG) the opposite is most beneficial.

It is worth making clear that these speculations do not attempt to answer what mechanism underpins *RNG anomaly*. Instead, reference will be made to psi, which might be (1) causal PK, (2) ESP (as per anomalous cognition) or (3) a unified ESP-PK mechanism (where ESP is the interface to regular cognition and PK the carrier signal that 'transmits' any information).

From the discussions within this thesis it would seem plausible that emotion and psi have some sort of inter-relationship, such that changes in the level of emotion, or a shift between emotional states (e.g. moving from anger to neutrality) facilitates psi functioning. In taking the view that certain mental states may mediate psi, one might logically infer that *brain states* have a role to play. For, if mental states (such as anger) are a function of activation in certain parts of the brain, and mental states influence psi, then it seems likely that brain activation influences psi functioning. This brain activation coupled to the specialisation of emotional circuitry raises questions of lateralisation. Research has consistently demonstrated that emotions are subject to hemispheric asymmetry (e.g. Tomarken & Keener 1998, Gray, Braiver & Raichle 2002). Left pre-frontal cortical activity is associated with positive affect, and

right pre-frontal cortical activity is associated with negative states, and trait-anger is specifically associated with increased left pre-frontal and decreased right pre-frontal activity (Harmon-Jones & Sigelman 2001) Therefore positive emotions mediate task performance on the left frontal lobe and negative emotions effect performance on the right frontal lobe. It may be that any psi-emotion interactions can only mediate the type of cognitive performances associated with the relative lobe.

On a basic level one might consider the interaction between affect and psi to be an energetic one. In generating a specific emotion, an individual energises the neuronal circuitry responsible for that state. In turn, the association network activates any related parts, including regions that facilitate psi. Because of the specialised circuitry of emotion, specific emotions might activate psi (where the associated link is strong) and others may have no effect at all. This naturally leads to a supposition that the stronger a *suitable* emotional response the greater the priming of the association network, and the greater the likelihood of a psi response (and/or the larger the size of the effect).

Alternatively one might contend that psi is a direct function of emotional firing, in that the neurons responsible for emotion, and the neurons that facilitate psi are one and the same. Psi becomes an epiphenomenon of emotional functioning. If the suggested patterns of chapter 5 prove valid, wherein specific perceptual episodes might be associated with specific RNG patterns (signatures), then such a view looks feasible. Each individual perceptual episode has a corresponding neuronal signature *and* a corresponding psi signature. If one could take a snapshot of the brain's state at that particular time, it would contain the data required to recreate the perceptual experience assuming it could be accurately remapped. Were a perceptual snapshot transmitted to another individual, they too would be able to (partially) experience the perception. It may be that psi operates by firing chosen neurons in the target agent. If psi were to operate in such a manner, pure clairvoyance would be impossible as no agent would have had the perceptual experience, and therefore could not transmit it.

Moving away from an energy model of emotion and psi, one might posit that emotion simply serves to highlight which aspects of the domain need to be manipulated. This can either take the form of emotion as marker where: *"emotions exist for the sake of signalling states of the world that have to be responded to"* p354, (Frijda 1988) or as cognitive evaluations (Ortony, Clore & Collins 1988). Under

either theory the interaction between psi and emotion could be viewed as directing psychic phenomena towards a specifically identified 'object'. Once an object has been flagged (or appraised), psi can be executed to influence it. The degree of emotion to which an object is attributed alerts the organism to the importance of the object and the potential amount of psi resources that should be given over. Fundamentally emotion can be viewed (in relation to psychic phenomena) as an heuristic that directs effort minimisation.

One must consider the RNG specifically here. Presumably if psi is in any way adaptive, it probably did not evolve to influence electrical currents in small electronic boxes. It seems more likely that psi developed to assist the host organism in its progress through the biological environment. One must remember that the RNG has been predominantly used throughout this thesis as an unconscious psi detector, and as such may not be the most suitable way of uncovering anomaly. Problems of replicability and effect may be due to the measuring system and not the phenomenon itself.

At this point one can consider incorporating emotion, psi *and* cognition into a unified system. Emotion seems to effect psi, and emotion can be derived from cognition. Thus cognition should be able to effect psi, either by acting directly, or via emotion, or as part of a whole (an inter-related network of association).

Emotion, cognition and psi

In chapter 1, attention was directed at the notion of emotion and cognition proving separate systems. Yet examples from the literature (and the mechanisms that underpinned laboratory mood inductions) seem to show that both systems overlap to a significant degree, The concept of emotion and cognition as exclusive systems is outdated and as Ellsworth (1991) succinctly wrote: *"The opposition of cognition and emotion in psychological theory has... advanced many a scientific career while muddling science itself."* p143.

Much contemporary research has attempted to reconcile the two systems into a much more unified whole and various theorists have put forward interactionist approaches. The neuroscientist Joseph LeDoux (1989), for example, has proposed a model where the hypothalamus (being a component of

emotion) determines the significance of the stimulus leading to physiological arousal and cortex activation, which promotes cognitive processing. Gordon Bower (e.g. 1981) discussed earlier in the thesis considers the emotion-cognition interaction as very much a product of spreading activation. An outcome is the product of mood congruency from multiple points such as the time any relevant memories were codified, and the mood of the individual at the time of the cognition.

On of the most influential (and highly peer respected) interactionist models is Joe Forgas's 'Affect Infusion Model' (1995) which expands upon Bower's viewpoint by detailing testable hypotheses of when and to what level mood and cognition co-exist in the decision making process. Forgas has focussed on the role of affect in helping individuals make decisions in the social world, which seems relevant here as psi probably operates to help master the biological/social environment. As Forgas makes clear: *"Affect infusion occurs because planning and executing complex social behaviours usually requires high-level constructive inferential cognitive processes. Social actors can only make sense of ambiguous situations, and plan their actions and pursue their goals effectively by the constructive use of their pre-existing thoughts, memories and associations to create a meaningful cognitive representation of the social world."* p3 (Forgas 1999)

Affect infusion is the idea that emotion is integrated into the cognitive process, and that the level of infusion is dependent upon the type of processing strategy at the time. Forgas posits that there are two 'complementary' means of affect infusion. Either a direct means - *affect as information*; or indirect - *affect priming*. The affect as information model can be summarised by the individual asking how they feel at a certain time, literally *"how do I feel right now?"* The result of this then directs behaviour. Residue from previous emotional experiences can therefore taint state-emotion and mediate unsuitable behaviour. Consider how decision making can become volatile when in an angry state.

The affect priming model is, as the name suggests, more of a conjunction between emotional states and cognitive nodes. It operates indirectly, and does not require a "how do I feel?" action. In much the same way that some of the laboratory manipulations used cognition to prime emotion, a reversal of direction sees "*affect* [priming] *the encoding, retrieval, and selective use of information in the constructive process of social judgements."* Forgas 1995, p44

Low affect responses are used when the response pre-exists (i.e. the response has been made before), or the response is highly specialised and requires little other than cognition. High affect infusion strategies on the other hand are utilised when dealing with novel or complex responses. Forgas thus writes of a continuum (least affect to most) of four processing strategies: (1) direct access of a pre-existing response, (2) motivated processing – where the response is highly predetermined and does not require constructive thinking. (3) an heuristic (4) substantive generating process – using all available sources. In a nutshell simple and logical processing generates little affective assistance whereas the more complex and innovative the thinking needs to be, the more likely memory and emotion are used.

This does not mean that a particular mood state such as happiness primes all associated cognitive nodes, that would obviously diminish its effectiveness, rather affect acts as *"an additional source of selective activation among constructs already primed by other situational and contextual associations."* p45. The mechanisms referred to above each have a role to play such that selective attention sees 'observation' directed towards congruent matters, selective encoding sees that congruent details (as per state-affect) are encoded more strongly, and selective retrieval sees such memories retrieved more easily.

Thus looking at interactionist approaches (such as the Affect Infusion Model) allows a window of speculation into how psi might operate in the real world. Highly constructive processing benefits from heightened emotional memories and congruent mental states because they help generate novel or complex solutions. A positive correlation between emotion and psi could precipitate psi being used to glean further 'less accessible' information from the environment or another agent, information that could then be accommodated into a response pattern. Alternatively, the activation of psi could facilitate efforts to execute a particular response by making an object (whether living or non-living) more 'open' to the desired outcome.

If psi can be facilitated by cognition and emotion, its seems logical to assume they can constrain psi. One might argue that particularly emotional events do not always generate anomalies because individuals have differently held cognitions to goal state, belief, context, outcome and repercussions,

all under the dual umbrellas of consciousness and unconsciousness. These individual factors can have direct promoting or inhibitory impacts upon the level of psi response.

Brain states

Research, such as that from Michael Persinger (e.g. Persinger 2003, Persinger & Healey 2002) has indicated how examinations of the neurophysiology of an experience/phenomena can help explain the underpinnings. Persinger has reported how 'feelings' of sensed presence can be mediated through low order, pulsed, complex magnetic fields. Persinger typically applied these fields to the temporoparietal regions on either a single hemisphere or both in experimental participants, and one of the most common resulting effects was emotional shift (specifically the induction of fear). Thus there may be some wisdom in looking at both naturally occurring and artificially generated firing patterns in psi agents.

If psi is a function of neuronal activity, ergo neuronal energy, then looking towards individuals with aberrant brain activity may be of some value. Consider an anger episode – predominantly operated through activation of the temporal lobe, and primarily the amygdala and hypothalamus. One might hypothesise that individuals with brain activation anomalies specific to these parts of the network might (as part of an emotion-psi model) produce heightened emotion and heightened psi. Studies may not be able to tell us whether it is ESP or PK in operation, but a link between firing rates and measured anomaly helps determine what areas occasion anomaly. Research could look into internally generated or externally applied (e.g. electrical) neuronal stimulation alongside psi measurements, and in doing so, get a clearer picture of whether the level of energetic response is most important or the type of response.

Epilepsy is fundamentally a disease wherein neurons within localised regions (partial seizures) or the brain as a whole (generalised seizures) suffer from an over-excitation (typically through lesions or a neurotransmitter imbalance, such as a reduction in GABA). The idea, therefore of epilepsy originating in regions that mediate emotion provides some cause for thought. As mentioned in chapter one, William Roll posited that up to a quarter of RSPK agents investigated had either epilepsy or dissociation.

Estimates vary as to the likelihood of epilepsy, with US reports suggesting that around 1% of the population have a form of epilepsy. Of these, estimates further suggest half of partial lobe epileptics have temporal lobe epilepsy, home to various emotion circuits. As seen, increased activity in the amygdala would present a situation where there is an enhanced emotional response to stimuli, and some studies have shown how epilepsy can be invoked by angry thoughts, (Feldman & Paul 1976, Fenwick 1991).

As discussed earlier in the thesis, the amygdala has been shown to be involved in emotional facilitation surrounding auditory and visual stimuli (Morris et al 1996, Scott et al 1997). Temporal lobe epilepsy that involves amygdala activation has been shown to *"most often... occur in combination with hippocampal damage or with damage to the cerebral cortex, cerebellum or thalamus"* Pitkanen et al (1998), p239. Other studies seem to show that as the number of seizures increase, damage to the amygdala (in terms of volume reduction) also increases. Cendes et al (1994) found that 34% of their subjects with temporal lobe epilepsy experienced the emotion of fear during a seizure, but that this percentage was associated with a marked decrease in amygdala volume. Subjects with 91% of the volume did not experience fear. Thus consideration of the link between epilepsy and psi will have to ponder whether psi is a function of neuronal activity or a consequence of structural damage. In addition, some of the data in this thesis suggests that the maintenance of an emotional state is not necessarily the catalyst for psi rather that it is the shift between states that counts. Therefore it may be that the inhibition of certain areas coupled to the excitation of others creates an imbalance that promotes psi.

There are potential directions for research that examines functioning in brain regions. Firstly fMRI imaging techniques could be employed to search for links between psi effects and localised brain activity. Using region specific stimuli, subjects could be tested under conscious (volitional) and unconscious PK protocols, that then provide data for pinpointing active parts of the brain. Additionally experiments could be run with subjects who have aberrant brain functioning. Perhaps situational RNGs could be placed alongside in-patient epileptics and attacks synchronised with RNG output?

Whilst environmental factors such as GMF and lunar phase have been implicated in effecting psi results. One should question whether this is because they operate directly on psi mechanisms or because they influence the mental states (such as mood), or the neuronal activation patterns of agents. Whilst discussion has centred above on the idea of internally generated brain dysfunction, it may be that externally derived magnetic fields have some impact upon brain states which has implications for both regular cognition and psi functioning. (e.g. Paul Stevens 2001)

Pre-stimulus or pre-sentiment response.

Recently there has been wide interest within parapsychology as to the findings of so called pre-stimulus or pre-sentiment studies. Generally speaking, these studies use the galvanic skin response of a human percipient as the measuring system for randomly presented (and therefore unpredictable) stimuli. Protocols usually take the form of highly evocative images randomly interspersed amongst neutral ones or the use of startling auditory stimuli (a blast of unpleasant white noise) amongst control periods. Great care is taken by researchers to try and prevent any form of cueing that would enable the subject to 'calculate' when an emotional target might be presented. Likewise, the presentation of *any* target is randomised so that normal anticipation effects can be minimised.

Radin (1997) reported on four studies he conducted with 31 participants, wherein electrodermal response, heart-rate and blood volume pulse were measured. Subjects were monitored during thirteen second periods which involved the subject commencing each trial by pressing a button, waiting five seconds, having an image displayed for three seconds, then watching a blank screen for a further five seconds. Following a short period, participants were able to start the sequence again (as and when they chose). The image was randomly chosen from a pool of photographs by the computer. Analysis centred around the physiological response differences between calm and emotional pictures and Radin reported that these more 'extreme' pictures, produced peaks just *before* presentation and just after the end of presentation.

Bierman & Radin (1997) reported in Perceptual and Motor Skills, the results from 5 studies that looked at the presentation of emotional and calm pictures, and also found patterns indicative of a pre-stimulus response. They went on to write: "*...different patterns of material like erotic versus violent, elicit*

different anticipatory response patterns, i.e., for erotic material peaking is just before the exposure starts while the EDA preceding violent material peaks 3 sec[onds] *earlier."* p689

To overcome potential problems of sequencing, the authors report some exploratory trials that replaced extreme pictures with calm pictures in sequence (inversely matched). Despite this, subjects still responded to the emotional stimulus.

The GSR response is indicative of an emotional response in many ways. The response takes a physiological form that is fast and reflexive, and which operates outside the realm of conscious thought. Such findings give more credence to the idea of affect primacy over cognition (e.g. Zajonc 1980). Such findings can also be assimilated into a linear model of emotion which basically sees a stimulus event regulated (in terms of perception, context, urgency and relevance) then a response. (Frijda 1986). Under an effort minimisation hypothesis, an agent uses psi to attend to meaningful stimuli that hold the greatest threat. Under naturalistic circumstances, action systems would benefit from forewarning of imminent surprise and operate as an early warning self-defence mechanism.

Emotional Atmosphere

The FieldREG studies discussed in chapter one alluded to the concept of emotional atmospheres that were cohesive or non-cohesive, and subsequently impacted upon the functioning of an RNG. *"An emotional atmosphere or collective mood... pertains to the collective behaviour that a group or society may manifest when it is focused on a common event, rather than to the emotional relationships between members of the society."* (De Rivera, p198).

Results from developmental studies have shown how atmospheres at home can impact greatly upon the development of a child. For example, Costello et al (2002) cite research that suggests mood within the developmental environment can have far reaching emotional consequences: *"Parents also provide the atmosphere in which a child grows up... For example evidence suggests that responsive caretakers may buffer the risk for depression and other forms of psychopathology."* p533. The concept of emotional atmosphere can then be extended to an emotional climate wherein the mood of group of people maintains over a period of time, (e.g. a climate of fear under a dictatorship). In turn emotional

atmospheres can be manipulated under the right circumstances to direct emotions in a particular direction. Consider for example a political rally. Whilst the attendees are undoubtedly bound by common beliefs, a skilled narrator can invoke deliberate mood states within listeners that then extend to the group as a whole.

De Rivera, invokes a structural theory of emotion, which shows that emotional atmospheres stem from the affective interactions between members of an environment, which under a feedback mechanism gives rise to emotional and behavioural modification. As emotional atmospheres develop one can envisage how psi might interact. Firstly, psi might be seen as part of the feedback loop such that two (or more) individuals covertly give out and receive information as to their emotional state. This would most likely occur under situations where outright expression was unwise. As more and more minds became involved together - an emotionally linked group could form.

Thus one might reconsider or reframe cohesion as part of an emotional atmosphere. As such, cohesion can either be seen in terms of a cognitive response, where members of the group consciously attend to an object and appraise it, or a paradigm of emotional attention, such that effects are mediated by sensory feeling. Looking towards the overlap between cognition and emotion, cohesion could be viewed as a unified function of both parts. Thus instead of generally considering the states of an atmosphere, there is plenty of scope for future research that looks directly and in a detailed fashion into the factors of emotion and cognition that make up a particular environment.

In conclusion, researchers might want to consider psi much more in terms of a function of brain state, look more into what factors interlink with these brain states (emotion, cognition, (dys)function and environmental factors). Then consider to what extent group effects are a product of the conglomeration of closely primed, synchronised and target-focussed mental states. The prospect of a multi-faceted, complex interactionist model seems inevitable, but may be the shrewdest way forward.

Chapter 12 – Discussion

This thesis originally stemmed from speculations in the parapsychological literature that emotion might mediate psi effects. The RSPK research of individuals such as William Roll provides some support for the idea that emotion underpins large scale macro events. Poltergeist outbreaks are commonly attributed to individuals who hold strong yet unrealisable emotional issues, which then give rise to unconscious venting in the form of anomalous activity. In addition, the FieldREG studies of Roger Nelson and Dean Radin amongst others, point towards the idea that RNGs are influenced by a 'cohesion of consciousness' within certain situations and subject groups. A view that can quite easily be reconsidered in terms of emotional involvement. Also, the PK literature in general has provided evidence in favour of productive mental styles such as 'non-striving' and 'effortless effort' in volitional studies. These strategies each involve emotional components, and it may be that non-striving protocols are effective because certain emotions are facilitated or inhibited (e.g. anxiety is reduced). On a more general level it would seem logical that mood could have a role to play in mediating psi, as mood affects everyday human performances to a high degree.

Following from these findings, I turned towards the emotional literature which illustrated how emotional responses tend to geared around minimising and reducing negative states. Positive states appear to provide little motivation to change behaviour, as the net state of the individual is not disadvantageous. Thus one might hypothesise that was PK to prove adaptive, it might be a function of the need to reduce unfavourable mental states.

Typically, parapsychological experiments into mood have revolved around ad hoc and post hoc evaluations. There is a lack of research that has looked directly towards manipulating emotional states and examining whether anomalous effects are subsequently generated. Thus, this thesis sought to examine experimentally how mood, specifically the negative emotion of anger, could affect the interaction between mind and matter. An RNG was chosen as act as the measuring system because of its apparently non-influencible nature. As table 12.1 indicates, results provide support for emotion, both in terms of dissipation and (to a lesser degree) induction, facilitating mind-matter interactions.

Table 12.1 – Main Results Synopsis

Summary of results
Chapter 3 - Animal Rights Experiment
Pilot - cumulative anomaly during anger narratives (SZ = -1.976, p=0.048, two tail), predicted
Pilot - trend of cumulative anomaly across trials overall (SZ = -1.755, p=0.08, two tail)
Formal - trend of cumulative anomaly during the autobiog. recall of anger (SZ = 1.826, p=0.068, two tail), predicted
Formal - trend of cumulative anomaly during the autobiographical recall of elation (SZ =1.691, p =0.09, two tail)
Formal - trend of cumulative anomaly across trials (SZ = 1.477, p =0.14, two tail)
Chapter 4 - Target matching
Conditions showed no significant anomaly against chance expectancy, no prediction made
E.g. Condition 1(single group t-test, t= -0.668, df=999, p=0.504, two tailed)
Chapter 5 - Self referential statements
Trend of cumulative anomaly as subjects dissipated anger state (SZ = 1.783, p=0.074, two tail), not directly predicted
Anomalistic trend during initial emotional dissipation (Chi Square, X=41.8, df=29, p =0.058)
Chapter 6 - Text Generator
Pilot trials - inconclusive
Chapter 7 - Musical Mood Induction
Trend of cumulative anomaly during initial neutrality induction (SZ = 1.848, p=0.064, two tailed), predicted
Cumulative anomaly during dissipation of depression (SZ = -2.305, p=0.022, two tailed), predicted
Anomalistic trend during depression induction (Chi Square, X=28.73, df=21, p =0.12)
Anomalistic trend during elation induction (Chi Square, X=30.38, df=21, p =0.08)
Text generator data inconclusive
Chapter 8 - Video Mood Induction
Significant variance during anger dissipation period (Chi Square, X=32.729, df=20,p=0.036), predicted
Text generator data inconclusive
Chapter 9 - FieldREG I
World Cup - Significant variance during half time periods (Chi Square, X=39.188, df=22, p=0.013)
Other football - Significant variance during sampled episodes (Chi Square, X=56.889, df=38, p=0.025)
Other football - Significant variance during gameplay periods (Chi Square, X=53.857, df=38, p=0.046)
Chapter 10 - FieldREG II
Exercise - Cumulative trend across trials (SZ= -1.579, p=0.11, two tailed)
Computer Gaming - Anomalistic trend during experiment 3 (Chi Square, X=15.071, df=9, p=0.089)
Sleep - No anomaly. (Chi Square, X=41.964, df=44 p=0.56)

The Animal Rights experiment in chapter 3 bore witness to cumulative anomaly during both the autobiographical recollection of anger, and elation. As discussed in the chapter itself, it became apparent during debriefings that formal trial subjects were aware of the animal cruelty narratives and this undoubtedly diminished their response patterns during those sections. Chapter 5 saw subjects in multiple trials use self-referential statements to generate once again, anger and happiness. This approach yielded cumulative RNG anomaly during anger dissipation periods. Likewise both of the experiments from chapters 7 and 8 saw anomaly during their mood dissipation phases. Chapter 7

specifically saw RNG anomaly associated with dissipation from a state of depression. Thus, there would seem to be good support for a view that negative mood dissipation in some way propagates PK. In fact, one could reframe the positive results from the elation induction in chapter 3 as a process that dissipated the previous anger states.

One point of interest is how the effect sizes calculated in this thesis measure up to comparable studies. The most relevant benchmark is undoubtedly trials from the FieldREG literature, Roger Nelson has privately indicated that resonant (high cohesion) datasets have a cycle based effect size between 0.005 and 0.007, whilst the non-resonant datasets are near zero. As the reader will have noticed, effect sizes from the studies in this thesis have tended to be larger by a factor of between five and ten. For example the effect sizes for the dissipation phases in chapters 5, 7 and 8 were 0.038, 0.048 and 0.051 respectively. Chapter 3 meanwhile held effect sizes of around 0.035 during anomaly. Despite these healthy effects, overall significance has rarely been broached and that might be considered predominantly a factor of the low power (in terms of trials) employed. Future experiments will need to boost power not necessarily through more subjects, but potentially through higher bit generation (unless of course higher bit rates prove harder to process). In turn, the variance in effect sizes might suggest that PK interaction cannot be seen as either on or off, rather that it is graded and that certain states generate larger effects. As mentioned throughout this thesis, there is some concern that multiple analyses may account for some of the results. However, in the author's opinion multiple analysis is unlikely to have accounted for the overall effects as defined periods and analyses were made a priori (negating the possibility of data mining) and there seems to be a consistency across experiments.

The idea that mood dissipation periods are anomalous can be examined by comparing bit streams against chance expectancy, but also by carrying out post-hoc analyses comparing dissipation phases with contrasting 'control' periods. The question therefore is what period to compare a dissipation output against? Problematically, 'neutral' periods in this thesis are anything but, with instructions for subjects to clear their minds - neutral periods effectively become dissipation periods. In turn, elation sections can be considered (as part of the wider picture) a change from a less positive state into a more positive one and are therefore about diminishing negative affect (more dissipation). Also, the baseline periods (when subjects are reading instructions) are too limited in run length. Thus the only period

which fulfils a neat definition of control has to be the induction phase (where negative affect is explicitly increased) that immediately precedes the dissipation section. As such, table 12.2 below shows the outcome of analysis that looked at two distinctively contrasting periods: same-state induction and dissipation. Bearing in mind that the RNG is an entropic system and that each bit is independently generated, 2-sample t-tests were employed. Since this is a post-hoc analysis, the reader will note that data for chapter 3 is presented in both individual and combined forms. All figures are based on the maximum number of calculable data.

Table 12.2, post hoc comparison of negative state induction and dissipation periods.

t-tests between 'negative state' induction and dissipation phases			
Chapter		Comparing	t-test outcome (two tailed)
3	pilot	anger induction (section 3) versus dissipation phase (section 4)	t= (-1.456), df=16, p=0.165
3	formal	anger induction (section 3) versus dissipation phase (section 4)	t= (-1.784), df=30, p=0.084
3	combined	anger induction (section 3) versus dissipation phase (section 4)	t= (-2.318), df=48, p=0.025
5	formal	anger induction (section 2) versus anger dissipation (section 3)	t= (-1.582), df=50, p=0.119
7	formal	depression induction (section 2) versus depression dissipation (section 3)	t= (1.344), df=40, p=0.186
8	formal	anger induction (section 2) versus anger dissipation (section 3)	t= (0.518), df=38, p=0.607

Although there was only one significantly anomalous outcome (and that was through the combination two sets of data), table 12.2 illustrates that there is some support overall for the idea that anger dissipation periods aside from being statistically anomalous in their own right, also differ from contrasting control periods of emotion. Only the data from chapter 8 resolutely fails to provide such support. Once again, these results indicate that power is one factor that should be addressed in future studies.

The idea that change may be associated with anomaly has also come from other sources. Work over the last few years from Edwin May and colleagues (e.g. May, Spottiswoode & James, 1994 and May Spottiswoode & Faith, 2000) appears to have some crossover with ideas put forward in this thesis. May

et al. have hypothesised that if anomalous cognition operates like the other known senses, then 'busy' stimuli containing 'changes' of information (as per Shannon entropy) should generate increased perceptual responses and thus prove 'easier' for subjects to guess correctly. To draw a basic example, a red screen generates a lower perceptual response (in terms of activity) than one that is blue and red and has green circles. Forced choice results from the above studies provide a degree of support for just such a hypothesis, such that images with greater variation in intensity patterns were indeed more likely to be accurately selected, than images with lower levels. However, the reported relationship between entropy gradient and trial success was low, correlating at just: ρ=0.212, p=0.034, (May et al 2000), and the overall use of dynamic clips within ESP protocols has not provided the jump in effect size that might be expected. Nonetheless, the view that brain functioning is fundamental to both ESP and PK effects seems highly probable. Whether these effects are a function of activity level, or due to other factors such as structure, remains to be seen.

Moving away from the idea that PK anomaly is an epiphenomenon of anger dissipation, or a by-product of neural firings, one might turn to the idea that anomaly independently *serves a purpose*. From an evolutionary perspective, efforts to dispel negative mood states are important. Anger states serve the important functions of: highlighting situations that an individual might need to act upon, alerting offending parties to the displeasure of said individual, providing warnings of potential conflict and altogether illustrating that certain interactions are unacceptable. Nonetheless long term possession of angry and hostile states places the individual under an inflated health risk, and can generate immediate short-term dangers when an individual reacts unsuitably or disproportionately to provocation, and becomes involved in an avoidable conflict. Therefore, it is in the self-interest of the organism to reduce anger states if the stimulus does not warrant an immediate reaction. This reduction does not mean that an individual fails to attend to a troubling stimulus; as seen individuals seem quite capable of storing lower level provocations and then acting upon them once a suitable trigger point is reached.

As discussed, preventing an anger outburst can be predominantly achieved by acting upon the root cause (rationally), by isolating oneself from the problem (e.g. removing oneself from the environment) or by giving release through another defence mechanism (e.g. displacement). These processes would

begin as soon as the mood state starts to form, as negative states are uncomfortable ones and the sooner they can be assuaged (or acted upon) the better. Thus one can explain how mood induction and mood dissipation both facilitate PK. During the laboratory induction processes, self report data seemed to indicate that heightened levels of anger were generated. But these levels were not caused by any form of direct victimisation towards the subject, rather by the recollection of personal episodes or through empathic processing. Subjects have no root cause to act upon or direct their anger against, and similarly have no means of isolating themselves from the stimulus. Thus one might hypothesise, that the individual seeks to reduce (ostensibly inappropriate) mood states by looking to unconsciously vent negative affect. Dissipation periods enjoy more obvious psi effects because cognition is primed to consciously attend to the cause of the emotion and explicitly seek ways to reduce the anger state, both conventionally and through anomalous channels. One way of testing this hypothesis would be to generate anger states in a subject population and then see how RNG anomaly varies according to the release mechanisms available. In one condition, subjects would not have any conventional means of reducing their emotional levels; in many ways they would just have to sit and bear it. In other conditions, different means of reducing anger could be provided. Perhaps subjects could be given the opportunity to remove themselves from the induction environment, alternatively a pleasurably distracting task could be available. One could then see whether times of blocked emotional reduction precipitate psi, or whether it is simply the induction process.

Under a 'blocked release' hypothesis, it is worth pointing out that whilst anger serves a vital purpose in the real world, one should not expect each and every anger episode to bring about psi anomaly. Rather it would seem more likely that PK is generated according to the strength of the emotional response and whether the individual is able to sanction an angry outburst. Thus one could specifically predict that scenarios of high affect and blocked response would be most PK conducive. On occasions when anger *cannot* be acted upon, unconscious releases may still be invoked. After all we have seen how there is a need to buffer episodes and their associated emotions. Otherwise one runs the risk of acting upon the emotional residue of one event, leading to a misdirection of wrath against an unrelated subsequent event or individual.

The FieldREG studies of chapters 9 and 10 are harder to interpret. With chapter 9, although it would seem that emotive environments can catalyse PK activity, the approaches employed require treating group dynamics as a black box system. Post hoc discussion surrounding frustration and release of effort effects can only be treated as speculations. If group factors can be separated out accurately (without diminishing ecological validity) then further PK insight opens up to the researcher. Although Chapter 10 produced no significant trials overall, trends did emerge (for example with computer games) - endorsing the validity of in-situ exploratory approaches. The computer games data shows how highly competitive skill based tasks could provide the impetus for participants to produce high level efforts in beating an opposition. If subjects are aware that task success depends upon their abilities and construe failure as a result of lesser ability, it seems probable that motivated efforts will be undertaken to preserve perceptions of self worth. If subjects believe that some random element is the primary force behind winning and losing, there may be a lower motivation to perform maximally, as it may not be perceived to have much effect on the outcome. Once again the use of a selected population may assist the researcher; choosing motivated subjects of similar ability could be expected to bring out the competitive urge fully.

Although the sleep data failed to yield significant outcomes, I remain convinced that unconscious interactions need further study. If the anger hypothesis holds true, whereby negative state mediation generates PK then one can infer that dream states, which can be as conflicting as conscious states, may also produce anomalies. If nothing else, one would get a better picture of unconscious processing. Is psi a product of consciously derived goals or unconsciously derived ones? Alternatively it may be the case that there are definable limits to psi functioning - limits that were reached under sleep paradigms. Formal sleep studies under controlled conditions with physiological monitoring and standardised dream reporting may go some way towards shedding light on the matter.

Chapter 11 began to piece together some of the theoretical considerations into the nature of PK. Especially important, in my opinion, is the dynamic interaction among psi, emotion and cognition. For so long in parapsychology, researchers have pieced out small parts to the overall puzzle, and whilst there is confidence that factors such as belief, task strategy and certain environmental factors, can effect outcomes, there is little in the way of a unified theory. Now it may be that emotion should be

added to the list. Since all these factors appear to influence psi, perhaps it is time to incorporate them into an inclusive mental model of psi. By doing so, testable predictions as to the likelihood of an anomalous event and (perhaps) the size of that event should become available. Such a model would also highlight which aspects might be learned, practised or avoided by subjects and experimenters, to boost PK functioning.

Data from this thesis have also illustrated two primary patterns of RNG anomaly. Firstly anomaly can take the form of low level 'directional drift', where a majority of trials produce a bias that accumulate in a single direction. These trials do not display particularly strong anomaly; an overall effect is simply the product of quantity. As can be seen from table 12.1, results from the mood induction experiments in this thesis tend to be of this type. Alternatively, an effect comes about when individual trials display larger scale anomalies of variance, which act above and below chance expectancy. One might therefore query why this divergence occurs. In many ways an obvious explanation is to look towards the experimenter who is in some way shepherding the RNG output. It seems improbable that an experimental episode sees a subject influencing all possible RNG systems everywhere. Rather it is more likely that psi interactions are guided (in some form) towards a specific device by some third party. Fundamentally it may be that the experimenter brings his own psi to bear on the system (either through anomalous cognition or causal PK) and ensures that lower level subject effects produce some kind of meaningful outcome. The idea of 'meaning' is important here. As mentioned previously, the researcher has ownership to the experiment and the data within. It is in his interest therefore to make sense of the data and produce results that have tangible properties. I freely admit that when I began to carry out formal trials, despite remaining blind to the outcomes, I anticipated cumulative directional effects. It may be that the results found above are a function of my expectation. As such I would strongly advocate future studies (both for PK but also ESP) to incorporate detailed and formalised procedures that quantify the beliefs and mood states of the experimenter at regular intervals, especially during experimental testing.

Although the RNG has many points in its favour such as fast data collection, automated recording and a supposed invulnerability to non-psi influences, it does suffer from the problem that significant trials under passive protocols carry no inherent meaning. Thus I am in favour of utilising biological measures

for future research. One might firstly argue that biological systems are far more amenable to influence than RNGs because of material similarity. Secondly physiological change can be understood more easily. E.g. an increase in heart-rate is associated with activity readiness. Biological studies also help to create more of a division between models of anomalous cognition and causal PK. During the early stages of this thesis I explored this option thoroughly, familiarising myself with protocols and minimum standards for bacterial growth as a measure of mind matter interaction. In the end, the approach was dropped due to prohibitive costs and the need for hugely elaborate experimental setups.

Emotion undoubtedly developed because of its adaptive value, both in terms of evaluating outcomes and providing a communications channel to alert others to our mental states. This communication enables a third party to modify their behaviour in line with the predicted response that an emotional state propagates. Intuitively we recognise how our conduct and attitudes can produce shift in another's emotional state. This feedback then enables us to adjust the interaction. Thus one might also speculate that emotion and it's associated PK, acts as an unconscious or covert communications channel. As mentioned in chapter 11, emotional atmospheres and climates may derive from some form of emotional communication between members. The question for the parapsychologist is whether these communications also take psychic paths. Maybe there is scope for research that seeks to isolate groups of individuals (perhaps closely 'connected' ones?) from orthodox communications channels, then induce certain highly affective conditions. Efforts could be undertaken to minimise cognitive processing in favour of sensory experiences. Once again, an effort of this type would help fathom the level of importance mood holds in anomalous interactions.

This thesis has also looked at methods of mood induction, and various novel means of effecting emotion were undertaken. From the self-report data it would appear that the mood techniques were highly successful, but as each chapter made clear, results are due to more than the mood procedures. The relationship between the experimenter and subject is vital, both in establishing a rapport that encourages confidence in the protocol and in terms of honest reporting. Aside from the conventional effects of these interactions, it may be that rapport between subject and experimenter facilitates psi functioning. The author is aware of studies in progress that seek to explore this possible link.

Mood inductions are required to do two things. Firstly they need to shift mood in the target direction, and secondly they need to prove effective across as many members of the subject pool as possible. The technique pioneered in chapter 8 demonstrated it was capable of both, whilst chapter 5's reworking of the Velten procedure seemed highly effective with the limited subject pool. There may be some call for future research to directly compare (i.e. under highly similar circumstances) MIPs that use dynamic engaging presentations against the more traditional protocols, and quantify the levels of difference.

Looking back on the text generating protocols, one must come to the conclusion they were not a success. Despite judging procedures that were not blind to the experimental circumstance and therefore more likely to find congruent texts - little positive data, in support of language signals being incorporated into the RNG output were found. As with the sleep data, it may be that there are limits to the interaction between mind and matter. Perhaps language generation is too complex a protocol? Nonetheless, there is still mileage in the idea that alternative measuring protocols such as text generation may be applicable under particular circumstances. Volitional studies with primed and practised subjects who are aware of the language 'goal' in the experiment may prove more suitable. Alternatively, experimenters could move away from language towards alternatives, such as the generation of RNG derived graphical images or archetypes. An RNG (unbeknownst to the subject) could be used to randomly select from a pool of archetypal facial expressions. As chapter one illustrated, the recognition of emotion in faces appears a universal ability. Research could then centre around the idea of whether certain faces are more like to be produced in one mood over another, and whether the inherent meaning associated with a face corresponds to the emotional perceptions the subject is engaged in.

Experimental Directions.

Whilst this thesis has concentrated upon the induction of state-emotions, no effort was made to gauge the trait emotion of individuals. Whilst there is some history in parapsychology of examining the overlap between personality and psi these have typically been ad hoc measures. Thus, there is some sense in pre-selecting test populations of people who hold high levels of (specific) trait emotion. On a simple level, it is bound to benefit induction methodologies. On the other hand, it may turn out that individuals with high levels of trait anger and hostility, despite a relatively greater ability to enter target

states produce lower levels of PK anomaly. Perhaps hostile individuals derive comfort from the fact that they are prone to anger and associate anger as a strength. They may see a hostile personality as one that will not be taken for granted and thus enjoy entering such a state. If anger produces pleasure, then the hypothesis discussed above would probably not hold. Maybe we will find that individuals who have high levels of another emotion (such as elation) are more prone to PK because they seek to restore themselves to that state, by dissipating the anger they generate - promptly. So whilst trait emotions should be looked into, there may be a further need to engage detailed analyses of how individuals perceive those emotions.

Although this thesis used passive measuring systems with no feedback, trials that involve feedback are one obvious area of future research. Various options would be available to the researcher. Maybe subjects could be allowed to see how the RNG was functioning, or how their physiology changed in relation to emotional stimuli. Feedback allows for trials to be executed where state-emotion is varied in line with these factors, as figure 12.1 illustrates.

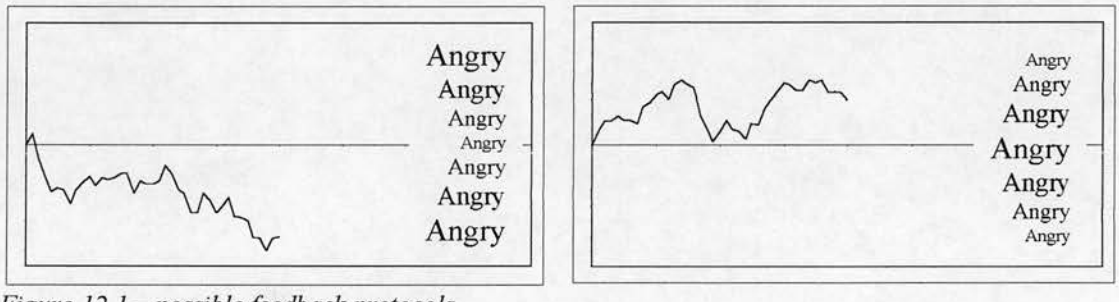


Figure 12.1 – possible feedback protocols

With 12.1, the level of emotion could be manipulated depending upon the output of the RNG moment to moment. 'Encouragement' could be provided either graphically or in an auditory form, urging subjects to *"Get angry"* or *"Calm Down"* as the RNG output moves in a particular direction. By having a balanced protocol, one can examine clearly whether increases or reductions in state anger facilitate anomaly. By automating the feedback, the overseeing experimenter could remain blind to outputs.

The use of MIPs that work around personal episodes of emotional arousal can be taken one stage further, by involving participants in the pre-trial planning stages. Few MIP studies have done this, because the mood induction, under most studies, is not the primary dependent variable. Mood change is simply the first step in testing another faculty. For experiments that seek to look at exceptional shifts in affect, highly specific episodes may need to be designed. Each aspect of the process could be tailor-made to fit with the participant, e.g. means of expressing anger can be personalised such that subjects can choose what method (if any is required) they might prefer to use. Some might opt for vocalising the event, others may choose to write it down and others internalise the episode. By letting subjects help create the experiment, they are given a degree of ownership to their trials and therefore have more investment in the outcome. Not only does this impact upon obvious points such as reducing the power imbalance (which might increase rapport), but may generate heightened desires (conscious and unconscious) in the subject to ensure that the experiment is a success. In many ways, this ownership issue is closely related to belief; by allowing the participant to come up with personally salient protocols, their belief levels are likely to increase, which may then kick-on to boosting psi anomalies. In turn, the creation of highly personalised episodes allows the experimenter and subject to get closer to realising fixed and replicable perceptual experiences enabling research into the concept of perceptual signatures underpinning RNG signatures.

From a perspective that looks towards ecological validity, there is prudence in examining emotional environments. Placing RNGs in environments, such as exam halls, car-impound lots and anger management classes that are expected to hold predictable emotion may generate anomaly. One could also look towards naturally occurring mood moderators such as weather. As seen previously – weather is capable of effecting mood quite substantially. An 'always on' RNG within a closed environment (e.g. an office) could be analysed to compare outputs during distinct weather events (e.g. compare storms versus pleasant sunny days). Regular measures of mood during these events should also be made.

There is also the opportunity to produce more evocative laboratory based mood induction procedures. The engagement of as many modalities as possible is one way forward, utilising as many of the senses as possible. For example, if a researcher was keen to generate happiness, he could provide 'pleasant'

sounds, sights and smells and suitably tactile objects, in a single perceptual episode. Alternatively, special mood chambers could be created where multiple variables could be controlled. Sensory deprivation should be available, removing extraneous noise and distractions. Video-panel walls would allow the experimenter to project chosen audio-visual stimuli in real time, creating salient episodes. A subject could literally find himself immersed in an experimenter controlled environment, (e.g. a protest march, the middle of a domestic row); which should help catalyse emotional responses.

The interaction between emotion, cognition and psi opens up one potentially interesting research approach. If one works with the model that sections of the mind responsible for psi are part of an activation network involving affect and cognition - might it be possible to generate PK effects through cognitive processing alone? Or might it be that some degree of emotion always required? Subjects could be asked to consider emotive issues (e.g. battery farming with an animal rights activist) whilst actively suppressing emotional responses. Rational evaluations, despite the suppression of mood arousal, may still 'fire' associated PK functioning.

The previous chapter dealt in some detail with the idea of using physiological measuring devices such as fMRI or PET scanners to uncover which brain regions are active during emotional and allegedly 'psychic' moments. If psi turns out to be a product of normal processes (and therefore does not involve supernatural abilities), these approaches offer the best way forward of pinpointing any 'seat of action'.

Closing remarks

Following the exploratory studies and accompanying deliberations, a degree of optimism is carried forward, that affect has an important role to play in mediating PK. Efforts have been taken throughout this programme of research to address potential sources of artefact and confound, and whilst there is always the possibility that positive results are due to such things, these results do suggest that the link between emotion and RNG functioning is palpable. Nonetheless, the experiments and accompanying speculations of this thesis merely represent the early stages of a potentially accessible and edifying approach into human performance.

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Birmingham Post

8 September 1999.

£600 FINES FOR FANS WHO USED HEDGEHOG AS FOOTBALL

Two soccer fans who used a hedgehog as a makeshift football during a drunken street kick-about were each fined £600.

Stephen Cornes (20) and James McKinnon (21) laughed and joked as the animal struggled for life after being kicked into the air up to tree-height, Worcester Magistrates' Court heard.

The two men attacked the animal, which died of multiple injuries after the incident, as they returned from a pre-season friendly between Worcester City and Nottingham Forest in July 1998.

McKinnon, a landscape gardener from Shap Drive, Warndon, Worcester and Cornes, of Cleeve Drive, also Warndon, were both found guilty by magistrates of causing unnecessary suffering to an animal.

Witness Mrs Maureen Hoskins told the court she recognised McKinnon after looking out of her bedroom window in Tolladine Road, Worcester, at about 11.20pm on July 21, 1998.

She told magistrates: 'They looked a bit like footballers tackling each other. I could see something at their feet. They were trying to kick something through some railings.

'They were scuffling like footballers tackling each other. They were shoving each other about.'

McKinnon then kicked the hedgehog between some railings and a post box into the middle of the road, Mrs Hoskins said.

'That's the point I became suspicious. A football would have bounced and rolled, but this was more a heavy scuffing sound.

'That was when it dawned on me that it was a hedgehog. There was no way it was a football.'

McKinnon had told an RSPCA inspector investigating the hedgehog's death that he and his friend had been drunk but had not kicked the animal.

Cornes told the court he had drunk just two pints of lager and had not kicked any object that night.

They were both fined £600 and ordered to pay £150 costs.

The prosecution was brought by the RSPCA under the 1996 Wild Mammals Protection Act.

Daily Mail

11 January 2000.

THREE MONTHS FOR THUG WHO PUT CAT IN THE MICROWAVE

A Factory worker who cooked his pet kitten for five minutes in a microwave oven was sentenced to three months in a young offenders institution yesterday.

Magistrates described Scott Taylor's behaviour as 'monstrous'.

They banned the 19-year-old from keeping animals for life after being told the pet suffered horrific burns that led to its tail and a leg being amputated.

'The facts of this case are quite appalling', Chairman of the Bench Liz Cardwell told the court in Nottingham.

She added to Taylor: 'You have been found guilty of monstrous cruelty and we have to make it very clear that this kind of behaviour is not acceptable.'

The court heard how Taylor told friends he cooked the four-month-old tortoiseshell, called Tilly, on full power for five minutes.
One of them, Gemma Etherington was so disgusted by his sadistic behaviour that she reported him to the RSPCA.

Miss Etherington told Magistrates: 'Scott told me he had gone to put a loaf of bread in to defrost and he decided to put the kitten in instead.

'He put the kitten in the microwave and switched it on full power for five minutes. He could hear it crying in the microwave and when he got it out it was sweaty.'

John Sutcliffe, prosecuting, said that when the RSPCA inspectors arrived at Taylor's home in Hucknall, Nottinghamshire, last March they found the kitten suffering from horrific burns to her legs, paws and tail.

'Amputation was the only option. The owner had left the kitten to suffer for four to five days after the incident,' he said.

Taylor was convicted in his absence of two counts of cruelty to animals after failing to turn up to court in November.

Yesterday he said he planned to appeal against the sentence.

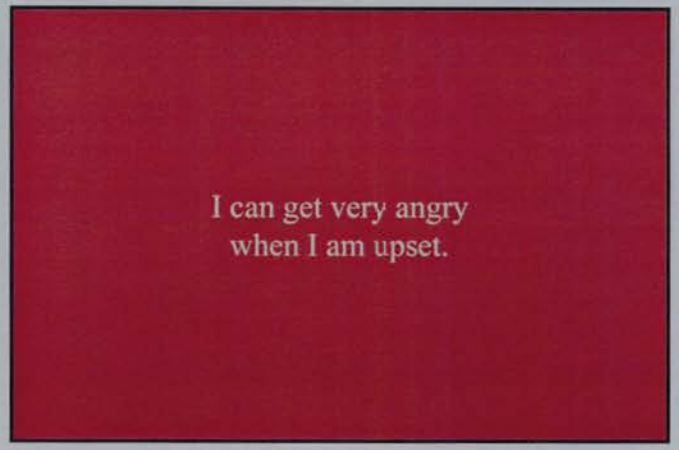
After the case, the RSPCA inspector in charge of the case said it was one of the most horrific cases of cruelty she had ever had to deal with.
Tina Gent said: 'When we found Tilly she couldn't walk properly because her legs were severely burned and sore
I cannot imagine how anyone could do such a horrible thing to an animal.'

RSPCA spokesman Jo Marlow added: 'We are delighted with the sentence and hope it will act as a deterrent to anyone else.'

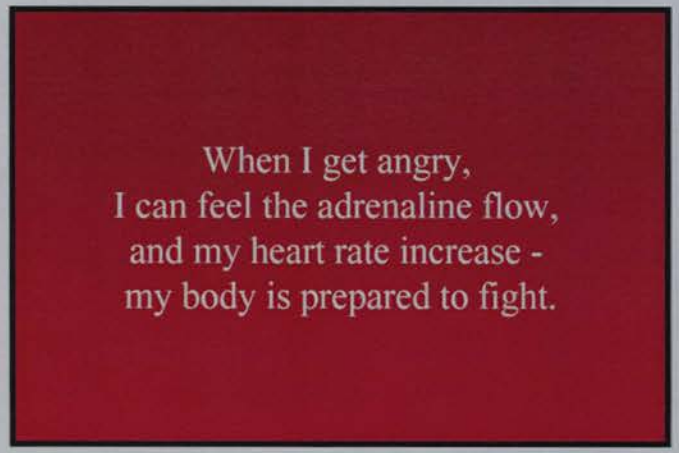
Tilly is now said to be 'doing fine' at the Doncaster home of her new owner Lorraine Tomlinson, a 40-year-old receptionist.


I feel relaxed and calm.
Nothing is bothering me right now.

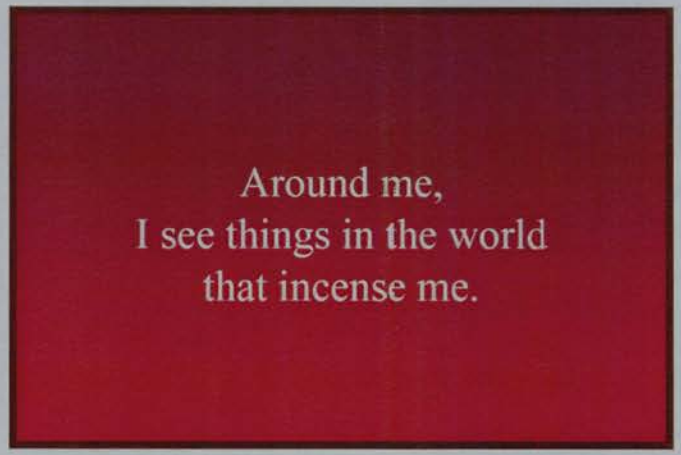
1


I can get very angry
when I am upset.

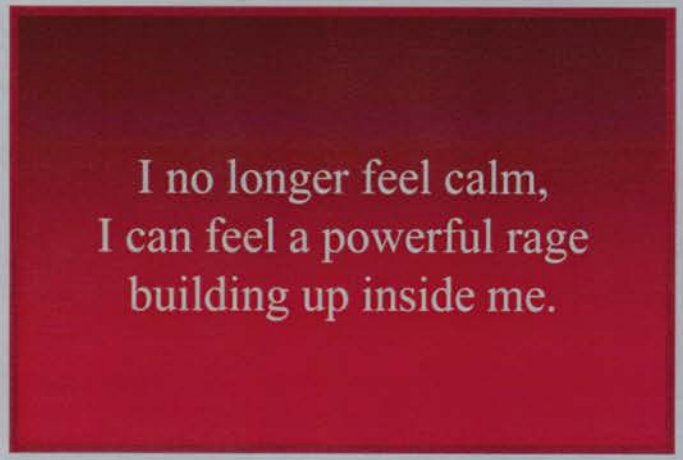
2


When I get angry,
I can feel the adrenaline flow,
and my heart rate increase -
my body is prepared to fight.

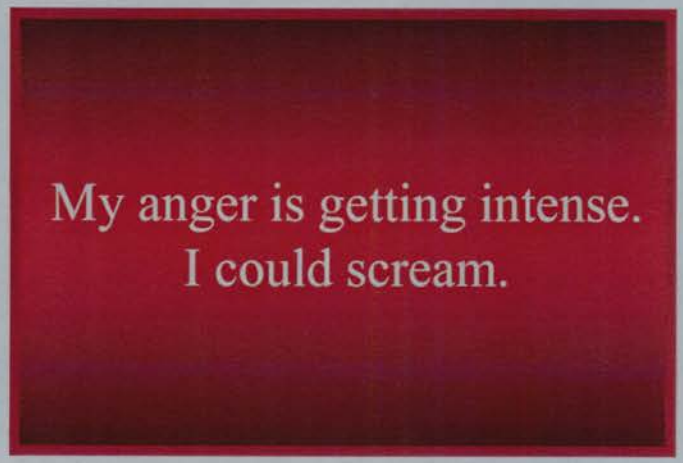
3


Around me,
I see things in the world
that incense me.

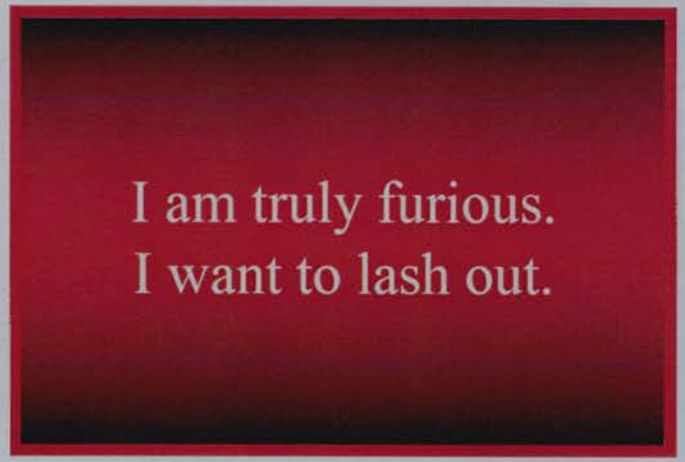
4


I no longer feel calm,
I can feel a powerful rage
building up inside me.

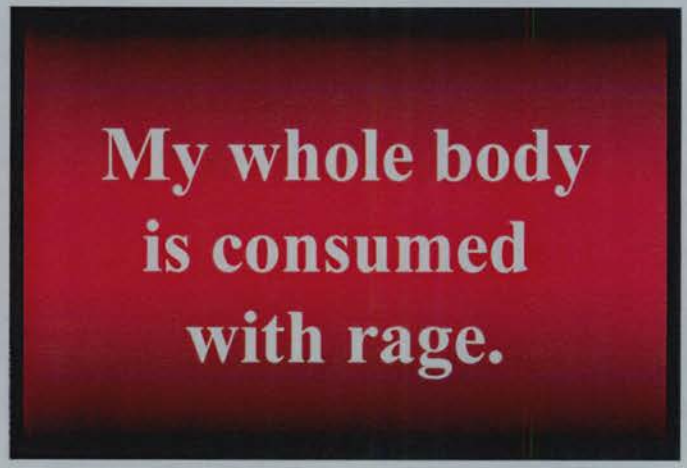
5


My anger is getting intense.
I could scream.

6


I am truly furious.
I want to lash out.

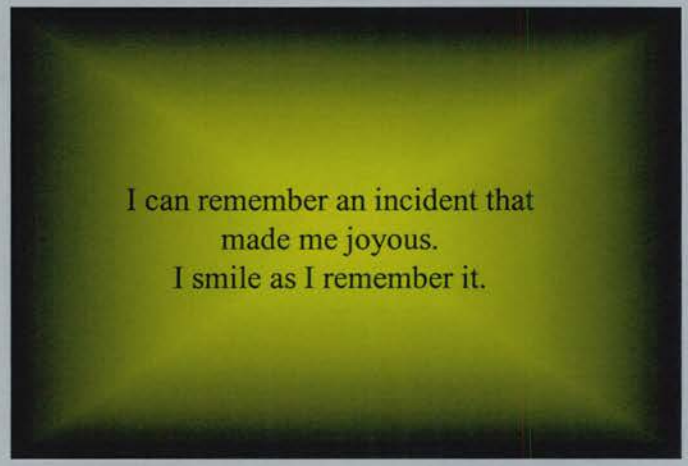
7


My whole body
is consumed
with rage.

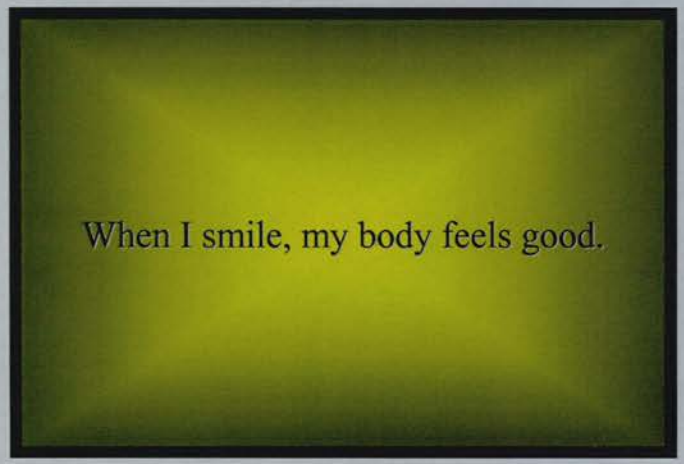
8


I feel relaxed and calm.
Everything is fine.

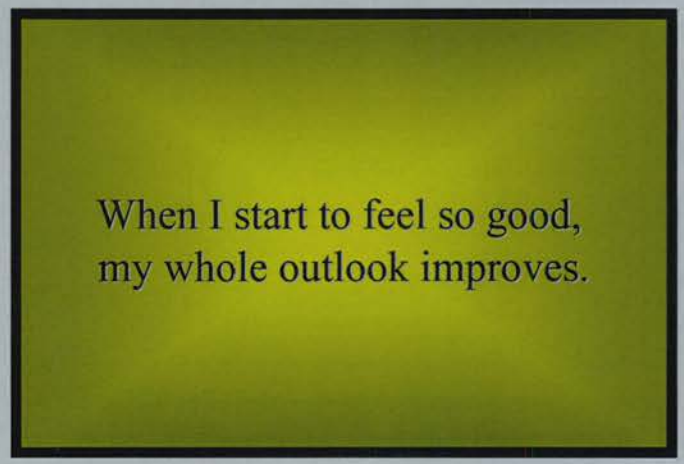
1


I can remember an incident that
made me joyous.
I smile as I remember it.

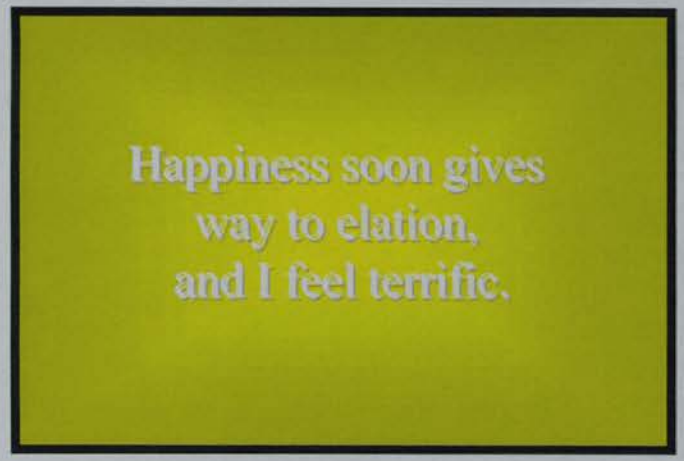
2


When I smile, my body feels good.

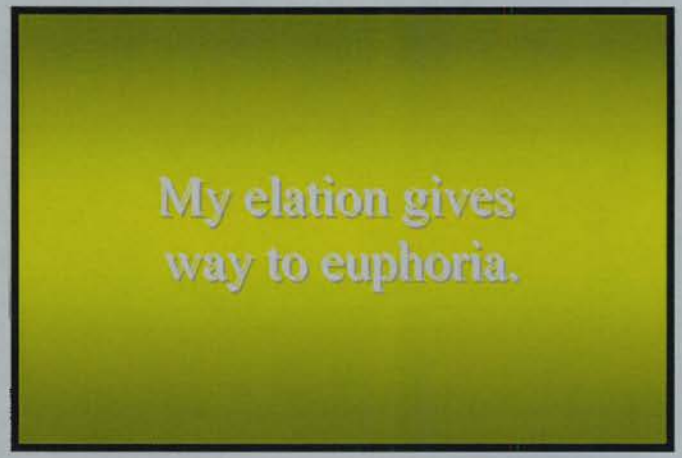
3


When I start to feel so good,
my whole outlook improves.

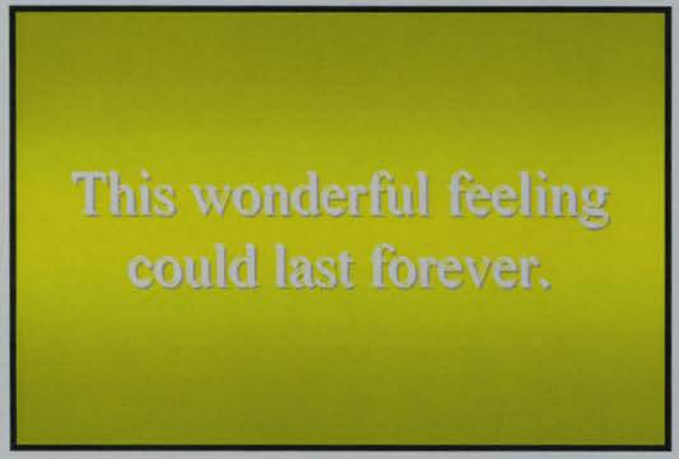
4


Happiness soon gives
way to elation,
and I feel terrific.

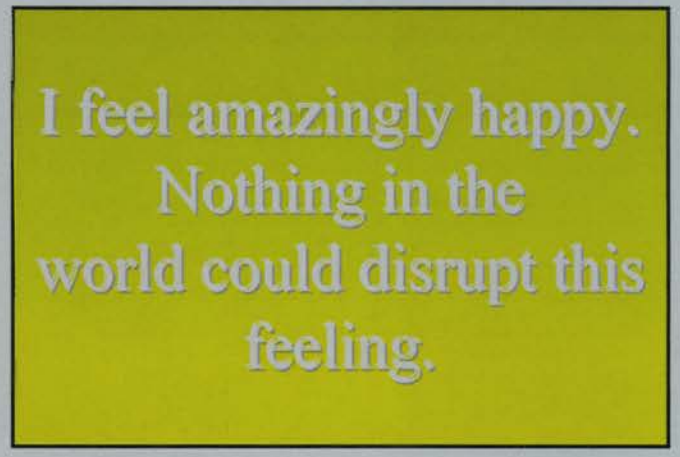
5


My elation gives
way to euphoria.

6


This wonderful feeling
could last forever.

7


I feel amazingly happy.
Nothing in the
world could disrupt this
feeling.

8

Appendix D – MMIP transcript

0.00 *Synchronizing signal for RNG*

0.23 "During this experiment, you will be asked to produce two emotions: Sadness and Happiness".

0.31 Feel free to use whatever techniques you think will best elicit the chosen moods.

0.36 Perhaps you could remember a life experience, that affected you particularly strongly; or recall an especially powerful scene from a film.

0.44 To further assist you, two pieces of music have been pre-selected, and will be played during the experiment.

0.52 Now, take a moment to consider how best to produce the desired emotions of sadness and happiness.

1.17 The experiment is ready to begin:

1.20 Take a moment to clear your mind of emotion.
Close your eyes, take some deep breaths, and relax.
Try to become emotionally neutral.

1.50 Now on the workbook in front of you please respond to question 1.
Q1, Visual Analogue Scale: Mark on the line below how sad you feel right now.

2.06 In this section, experience the emotion of sadness. Begin now.

2.13 **< The Swan of Tuonela, Op. 22 No. 3, by Sibelius >**

5.15 Now, returning to the workbook in front of you, please respond to question 2
Q2, Visual Analogue Scale: Mark on the line below how sad you feel right now.

5.28 Thank You.

5.30 Take a moment, clear your mind once again. Take some deep breaths and relax.
Return to your emotionally neutral state.

5.43 **< Babbling Brook >**

7.07 Please respond to question 3.
Q3, Visual Analogue Scale: Mark on the line below how happy you feel right now.

7.20 In this section, experience the emotion of happiness. Begin now.

7.30 **< Eine Kleine Nachtmusik, K525, Allegro by Mozart >**

10.20 Now. Please respond to question 4 on the workbook in front of you.
Q4, Visual Analogue Scale: Mark on the line below how happy you feel right now.

10.33 The experiment is now complete. Please press the 'space bar' on the computer.